



CCM-S Chain Condition Monitoring Operating Instructions



**ORIGINAL OPERATING INSTRUCTIONS
READ CAREFULLY BEFORE USE
RETAIN THIS DOCUMENT FOR LATER REFERENCE**

Table of contents

1	Introduction	5
1.1	Using these Operating Instruction	5
1.2	Change without notice	5
1.3	Presentation of the information	5
1.3.1	Symbols used	6
1.3.2	Trademarks	7
1.3.3	Notational conventions	7
1.3.1	Printing	7
1.4	Copyright	7
1.5	Liability	7
2	Use, obligations on the operator, basic safety instructions	8
2.1	Intended purpose	8
2.2	Use for a purpose other than the intended purpose	9
2.3	General notes on use	10
2.3.1	Qualified personnel	10
2.3.2	Changes to the programme	10
2.3.3	Replacement parts	10
2.3.4	Technical condition	10
2.3.5	Compliance with regulations	10
2.4	General hazard warnings	11
2.4.1	Risks / sources of risk	11
2.4.2	General accident prevention regulations	11
2.4.3	Power down systems before working on them	11
2.4.4	Hazard locations	12
2.5	General obligations on the operator	13
2.5.1	Monitoring behaviour	13
2.5.2	Selection and qualifications of staff, basic obligations	13
2.6	General safety instructions	13
2.7	Safety instructions relevant to the specific product or technology	14
2.7.1	Housing: Upper part and lower part (sliding shoe), SLS Material	14
3	Transport / storage	17
3.1	Storage conditions	17
3.2	Transport inspection	17
3.3	Packaging / re-packaging	17
4	Description of the overall system	18
4.1	Construction and function	18
4.1.1	Factors influencing measurement	18
4.1.2	Chain sizes	19

5	SLE function	19
5.1	General description	19
5.2	Functionality	19
5.3	Mounting Magnet	20
6	Scope of delivery	20
6.1	Tools required	21
7	Installation and commissioning	22
7.1	Installation	22
7.2	Software Installation	27
7.2.1	Installing iwis-CCM Monitor on the PC	27
7.2.2	Installing the iwis-CCM Monitor USB driver on the PC	28
7.3	Establishing a PC connection with the CCM-S	33
7.4	Setting up a new chain (also initial setup)	33
7.5	Reading/ Saving / Resetting the Error Log	35
7.6	Error log	36
7.7	Reading out elongation data locally	39
7.8	Updating the CCMS firmware	40
7.9	Connection / pinout	41
8	IO-Link information	42
8.1	Installation	43
8.1.1	General regulations	43
8.1.2	IO-Link	43
8.1.3	Connection	44
8.2	Device profile / Function Classes	45
8.3	Commissioning	45
8.3.1	IO-Link Device Description File	45
8.3.2	Device identification	45
8.3.3	Starting the IO-Link System	45
8.3.4	Process Input Data	46
8.4	Parameterization	47
8.4.1	Index 0x0010 – 0x0018: Identification parameter	47
8.4.2	Set Parameters	48
8.4.2.1	Index 0x0046: Scale Limit	48
8.4.2.2	Index 0x0047: Chain Logging Time	49
8.4.2.3	Index 0x004E: Standard Command	49
8.4.3	Read Parameters	49
8.4.3.1	Index 0x0041: Distance	49
8.4.3.2	Index 0x0042: Running Time	49
8.4.3.3	Index 0x0043: Average Speed	50
8.4.3.4	Index 0x0044: Actual Speed	50

8.4.3.5	Index 0x0045: Chain Period	50
8.4.3.6	Index 0x0048: Temperature Chain	50
8.4.3.7	Index 0x0049: Temperature CPU	50
8.4.3.8	Index 0x004A: Voltage 5V	50
8.4.3.9	Index 0x004B: Voltage 24V	50
8.4.3.10	Index 0x004C: Chain Direction Left	51
8.4.3.11	Index 0x004D: Number Chain Link	51
8.4.3.12	Index 0x004F: Count Measure	51
8.4.3.13	Index 0x0051: Product Specific Number	51
8.4.3.14	Index 0x0052: Custom Device Name	51
8.4.3.15	Index 0x0053: Number of acceleration data:	51
8.4.3.16	Index 0x0054: Number of length data:	51
8.4.3.17	Index 0x0055: Single Link Max Positions	52
8.4.3.18	Index 0x0200: Single Link Header	52
8.5	Diagnosis	53
8.5.1	Error Counter (Index 0x0020)	53
8.5.2	Device Status (Index 0x0024)	53
8.5.3	Detailed Device Status (Index 0x0025)	53
8.5.4	Device-specific Diagnosis (Index 0x0050)	55
8.5.5	ISDU error types	56
8.5.6	Process data Status	57
9	Technical data	58
9.1	Technical data CCM-S	58
9.2	Technical drawing CCM-S	58
10	Declaration of Conformity	59
11	Disassembly and disposal	60
12	Other applicable documents	60
13	References	60
14	Abbreviations / terms used	60

1 Introduction

These Operating Instructions have been formulated to give generic information. Because the different variants for this version are operated in the same way, the scope of applicability of these Operating Instructions has been extended accordingly:

Description	iwis-Item number
CCM-S-08B IWIS	40011816
CCM-S-40 IWIS	40011822
CCM-S-10B IWIS	40011817
CCM-S-50 IWIS	40011824
CCM-S-12B IWIS	40011818
CCM-S-60 IWIS	40011825
CCM-S-16B IWIS	40011819
CCM-S-80 IWIS	40011826
CCM-S-20B IWIS	40011821
CCM-S-100 IWIS	40011827
CCM-S-24B IWIS	40011828
CCM-S-120 IWIS	40011831
CCM-S-28B IWIS	40011829
CCM-S-140 IWIS	40011855
CCM-S-32B IWIS	40011830
CCM-S-160 IWIS	40011856

The details shown in the figures may differ but have the same functional structure.

1.1 Using these Operating Instruction

Make sure that you read these Operating Instructions carefully before starting to work with the product. These Operating Instructions contain important information that you will need for setting up and operating the product. In particular, they describe the proper use of the product and protect against incorrect use, contain safety instructions that must be observed and warn of risks and hazards that can arise even when the product is used properly.

Keep these Operating Instructions in a safe place so that they can be referred to a later date.

1.2 Change without notice

We constantly strive to improve our products. The information contained in this document is consequently subject to change without notice.

1.3 Presentation of the information

In order to ensure that this document allows you to work with your product quickly and safely, the safety instructions, symbols, terms and abbreviations used have been harmonized. To facilitate familiarization, these are explained in the sections below.

1.3.1 Symbols used

These Operating Instructions contain notes and information that you must observe to ensure your own personal safety and to avoid damage to property. The safety instructions are indicated by a warning symbol and appear as follows, depending on the risk category:

Table: Safety instruction categories






Warning symbol	Meaning
	DANGER indicates a situation of immediate danger that will lead to fatal or severe injuries if it is not avoided.
	WARNING indicates a situation of potential danger that can lead to fatal or severe injuries if it is not avoided.
	CAUTION indicates a situation of potential danger that can lead to minor or slight injuries if it is not avoided.
	TAKE CARE indicates a situation that can lead to damage to property if it is not avoided.

Table: Structure of the safety instructions

Incorrect action	Type and source of the danger
Warning symbol	Warning symbol as listed in the table
Reasons for incorrect action	Describes possible reasons for the incorrect action
Possible consequences of the incorrect action	Describes the consequences if the information is not observed
Measure to mitigate risk	Describes how to avoid the danger

Table: Structure of a note

Symbol	Meaning
	NOTE indicates important information or features and tips for using the product.

1.3.2 Trademarks

Products, names and logos used in this document are used exclusively for information purposes and may be trademarks of their respective owners, even if this is not explicitly indicated.

1.3.3 Notational conventions

Italic or bold typeface is used for the title of a document or for highlighting information.

Courier font is used for text that appears on the screen/display and for menu options in software.

" < > " is used to indicate keys on your computer keyboard (such as <RETURN>).

1.3.1 Printing

This manual was created with Microsoft Word for Windows on a PC.

This text has been printed using the Arial typeface.

Microsoft Word is a registered trademark of Microsoft Corporation.

1.4 Copyright

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Transmission, distribution, reproduction and / or utilization of this document and its contents (in parts or amendment) are prohibited, unless expressly authorized in writing. Offenders are liable to damages. All rights even in the event of patent, utility model or design patent.

1.5 Liability

The principles of liability are as laid down in the iwis Terms and Conditions of Sale and Delivery, available at www.iwis.com. No liability is accepted in circumstances that can be attributed to one or more of the following causes, except in the event of intent or gross negligence on the part of iwis:

- Use for a purpose other than the intended purpose
- Improperly performed work on the product
- Operation of the visualization interface in the event of technical faults
- Unauthorized mechanical or electrical changes to the product, modified configuration
- Repairs carried out without authorization
- Use by unqualified staff
- The use of unauthorized replacement parts
- Faulty installation and/or improper handling
- Failure to observe these Operating Instructions

2 Use, obligations on the operator, basic safety instructions

2.1 Intended purpose

The product is intended for industrial, not private use.

The product is intended solely for the purpose of measuring chain elongation.

Important note on the chain elongation value, inspection frequency and measurement:

The function of the product is only to provide information. No guarantee is given that the system will protect against failure of chain drives or machine stoppages. Reliable measurements can only be guaranteed if the chain is guided on both sides. Measurement is a contact-free process with no direct intervention in the chain drive. It must, however, be performed in a clearly defined status, which can only be guaranteed if the chain is guided on both sides.

Measurement of future chain elongation depends on inspection and maintenance intervals, which are in turn determined by the concrete usage scenario for the chains. External factors (e.g. inadequate lubrication, particle deposition, etc.) can increase the rate at which a chain wears. The customer is solely responsible for defining the inspection intervals and any special inspections.

The product does not show the evaluation of the measurements and any resultant effects on the machine/system of the user or any measures that need to be taken. This is the sole responsibility of the operator.

The product constitutes partly completed machinery as understood by the Machinery Directive 2006/42/EC. The product may only be taken into operation after it has been installed in the machine/system for which it is intended and if this machine fully complies with the requirements of the EU Machinery Directive. The product is not intended to be used outside the system.

You are permitted to use the product as follows:

- No changes, additions or modifications may be made to the product without the authorization of the manufacturer. This also applies to the installation of safety devices.
- The product may only be used if it is in sound technical condition. Any damage that gives cause for concern that the product may not function correctly must be inspected by specialist staff to ensure that it does not impact on safety. In cases of doubt, the manufacturer must be contacted (CCM@iwis.com).
- The product was designed for installation in a partly completed machine, a machine or a system.
 - o The product is not intended to be used outside the system.
- The purpose of the product is to measure chains that become elongated as a result of mechanical forces.
- The CCM-S should preferably be installed in the tight strand. The relevant minimum distances and maximum load on the measuring carriage and the overall system must be observed.
 - o See the section "Technical data".
- For the best and most meaningful results, we recommend that the chain should be cleaned before it is fed into the CCM.
- The device can be dismantled for the purposes of installation, maintenance and troubleshooting.
 - o Any work on the system may only be carried out as specified in the documentation, in terms of both the scope of the work and the sequence of the work steps.
 - o In the event of more extensive work, the manufacturer must be contacted (CCM@iwis.com).
- In the case of chains with attachments on one or both sides or extended pins, iwis must carry out a separate inspection. In this event, please contact iwis (CCM@iwis.com)!

The CCM is a test device and not a measuring device!

The CCM-S is designed for operation at a point-to-point IO-Link communication interface according to the international standard IEC 61131-9 with 230.4 kbit/s. Parameterization and device diagnostics are performed by the IO-Link master according to the *IO-Link Interface and System Specification*, Version 1.1 of the IO-Link group of companies.

The technical guidelines for setting up the IO-Link network of the PROFIBUS User Organization (PNO) must be observed for safe operation.

Intended use is deemed to include observance of the relevant Operating and Maintenance Instructions and adherence to the service and maintenance stipulations.

2.2 Use for a purpose other than the intended purpose

Any use other than

- that described as the intended use and
- that described in the relevant documentation

is not compliant with the intended purpose and is therefore not permitted.

The manufacturer shall not be liable for damage incurred as a result of use other than for the intended purpose. Any risks associated with use other than for the intended purpose are the sole responsibility of the user. Use of the product and, if present, its components other than for the intended purpose is understood to include:

- Its use for applications not explicitly approved by the manufacturer. In such cases it is imperative that you observe the information contained in the safety notices in the associated documentation!
- Constructional modifications to the CCM that destroy the original condition.
- Inappropriate programming or configuration of the system.
- (The responsibility and liability for any risks associated with the programming and configuration of the system lies solely with the user.)
- Never subject the product to impermissible mechanical loads. Never use the product as a handle or a step. Never place any objects on the product.
- Do not work with the product in potentially explosive environments containing flammable liquids, gases or dust.
- The device is not to be used in the area of intensive UV radiation (e.g. disinfection lamps or similar radiation).
- Permanent contact is not permitted.
- Do not open the sensor. Check the safety lacquer or safety screw.

2.3 General notes on use

2.3.1 Qualified personnel

The product may only be used and work on the product may only be carried out by qualified personnel. Qualified personnel are persons who by reason of their training, experience, instruction and their knowledge of the relevant standards, regulations, accident prevention rules and working conditions have been authorized by the person responsible for the safety of the machine or plant to perform the appropriate activities required. They are able to recognize and prevent potentially dangerous situations.

2.3.2 Changes to the programme

Do not make any changes to the programme (software) on the programmed system. The responsibility and liability for any risks associated with the programming and configuration of the system lies solely with the user.

2.3.3 Replacement partsc

Only use spare parts that comply with the requirements laid down by the manufacturer and/or supplier. This condition is always fulfilled with original replacement parts. Product liability shall cease, and the warranty shall become invalid in the event of repairs which are carried out improperly and the use of incorrect replacement parts.

2.3.4 Technical condition

The product may only be used if it is in sound technical condition. Any malfunctions that are detected, in particular those which could compromise safety, must be rectified without delay. Any damage that gives cause for concern that the product may not function correctly must be inspected by specialist staff to ensure that it does not impact on safety. In cases of doubt, the manufacturer must be contacted (CCM@iwis.com).


2.3.5 Compliance with regulations

It must be used in accordance with its intended purpose, in a safety-conscious and risk-conscious way and in compliance with the relevant regulations. The operator must ensure by suitable organizational and instruction measures that the relevant safety regulations and safety rules are observed by the persons entrusted with the operation, maintenance and repair of the product.

2.4 General hazard warnings

2.4.1 Risks / sources of risk

The product cannot operate autonomously. It is therefore a component that is incorporated into an overall system, which will generally comprise several components that interact with each other. The product is therefore not fitted with its own protective devices. It is therefore the obligation of the operator to ensure that the appropriate safety equipment is provided and that the staff are instructed properly:

Risk	Danger from moving components
Warning symbol	
Possible consequences of the incorrect action	Injuries
Measure to mitigate risk	Install safety/protection mechanisms, train staff

2.4.2 General accident prevention regulations

All the safety instructions given must be observed in order to ensure that it is possible to work safely with the product! In addition to the instructions given in these Operating Instructions, the local accident prevention and environmental regulations and any national occupational safety laws apply.

2.4.3 Power down systems before working on them

All work must be carried out with the system powered down as laid down in the safety regulations.

A qualified electrician or person who has received appropriate instruction must determine that all poles of the equipment at the workplace are dead.

Observe the following:

- Observe in-house instructions, for instance those in which specific, dedicated testing equipment or systems must be used.
- Check the voltage tester immediately before use and, wherever possible, after use.


If it is not possible to clearly determine that cables at the workplace are disconnected, other reliable safety measures must be taken, e.g. suitable cable cutting or cable puncture devices.


The 5 safety rules before starting work:

- Power down machines
- Prevent machines from being powered up again
- Determine that the equipment is dead
- Earth and short
- Cover or fence off neighbouring live components

2.4.4 Hazard locations

<p>Hazard locations are:</p> <ul style="list-style-type: none"> - points at which there is a crushing or scissor action (particularly in the vicinity of the point at which the chain enters the CCM!) - trapping points - points at which items are drawn in 	<p>The following can be the source of hazards:</p> <ul style="list-style-type: none"> - parts of the work equipment - tools of the work equipment or parts thereof - workpieces or parts thereof - other working materials or waste - Items that may fall or fly off in an uncontrolled manner and have the potential to cut, cause puncture injuries to or hit persons.
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Symbol	Meaning
	<p>NOTE Make sure that the hazardous locations are adequately guarded, rendered safe or removed. Ensure that occupational safety procedures are adequate and instruct staff not to reach into moving machine parts (see also the warning sign on the CCM-S).</p>

Symbol	Meaning
	<p>NOTE Do not work with the product in potentially explosive environments containing flammable liquids, gases or dust.</p>

2.5 General obligations on the operator

The operator is the person who either operates the machinery for commercial or business purposes themselves or who makes the machinery available for use by a third party. When the product is used, the operator must ensure that:

- the currently applicable occupational safety regulations are observed and implemented,
- a risk analysis is performed to identify risks associated with the working conditions at the deployment location,
- operating instructions for operating the product are available,
- responsibilities for installation, operation, rectification of faults, maintenance and cleaning have been unambiguously defined and assigned,
- all employees who use the product have read and understood these Operating Instructions,
- training is provided for staff and that they are informed of hazards at regular intervals,
- the necessary protective equipment is provided for the staff,
- the safety and danger notices on the machines/system are observed when the product is in use and that the notices are in a condition that allows them to be easily read,
- any applicable national regulations, standards and requirements are observed and adhered to.

2.5.1 Monitoring behaviour

The operator is obliged to monitor the behaviour of the staff in respect of their awareness of safety and risks at least occasionally.

2.5.2 Selection and qualifications of staff, basic obligations

Responsibility for assembly, installation, commissioning and operation must be clearly defined.
Staff who are undergoing training or instruction must be supervised.


Persons who are charged with assembling, operating, dismantling or maintaining products must not be under the influence of alcohol, other drugs or medicines that have a negative impact on their reactions.

2.6 General safety instructions

- Observe any accident prevention and environmental regulations that apply in your country.
- Observe the safety regulations and stipulations that apply in the country in which the product is used.
- Persons who are charged with assembling, operating, dismantling or maintaining products must not be under the influence of alcohol, other drugs or medicines that have a negative impact on their reactions.
- Only use accessories and replacement parts that have been approved by the manufacturer.

2.7 Safety instructions relevant to the specific product or technology

This section provides basic safety instructions relevant to the technology used in the product.

Symbol	Meaning
	<p>NOTE The product has not been certified and tested in accordance with the ATEX Directive 2014/34/EU (previously: 94/9/EC)!</p> <p>NOTE The product has not been certified and tested in accordance with IEC/EN 60079 standard (Intrinsic safety)!</p> <p>NOTE The product belongs to corrosion resistance class 5 as per ISO 9227</p> <p>NOTE If the product comes into contact with chemicals, a separate inspection must be conducted by iwis.</p>

2.7.1 Housing: Upper part and lower part (sliding shoe), SLS Material

See also description in chapter 4.

The following list makes no claim to completeness and is only an excerpt of the properties.

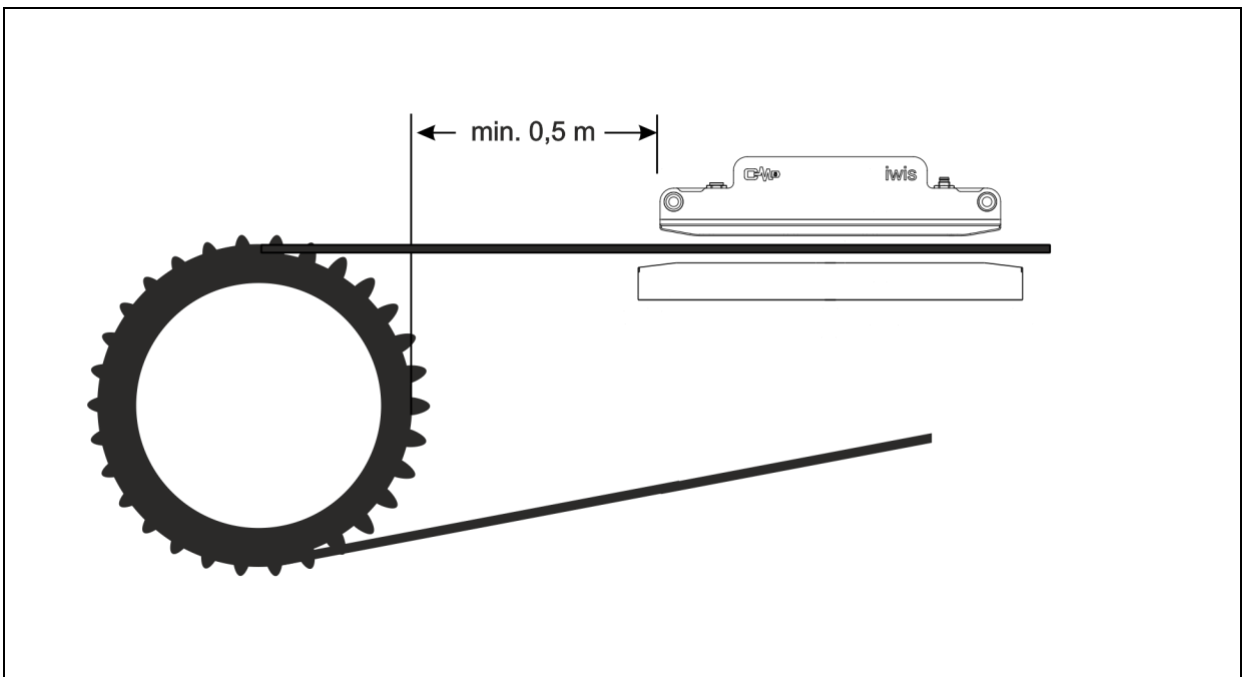
General properties	
Colour	Yellow, black
Max. Water absorption	1,9 % by weight
Max. Moisture absorption (at 23°C/73°F, 50% r.h.)	0,8 % by weight, test method DIN 53495
Sliding friction coefficient, dynamic, against Cf53 steel	0,26
Sliding friction coefficient, dynamic, against V2A stainless steel	0,18
pv-value, max. (dry)	0,35 MPa · m/s
Tensile strength	68 / 61 MPa Flat/Upright sintered

Physical and thermal properties	
Upper long-term application temperature	80 °C
Upper short-term application temperature	140 °C
Lower application temperature	-40 °C
Coefficient of thermal expansion (at 23°C/73°F)	$12 \text{ K}^{-1} \cdot 10^{-5}$, test method DIN 53752
Maximum recommended surface pressure (at 20°C/68°F)	46 MPa
Compressive strength	60 MPa
Thermal conductivity	0,14 W/(m · K), test method ASTM C 177

Resistance classes (at 23°C/73°F, 50% r.h.):	
+ resistant; 0 conditionally resistant; - unstable; x no data available	
1) The plain bearings are not chemically attacked by these substances. They can, however, be dimensionally altered by water absorption.	
+	Acetaldehyde (aqueous), 40 %
+	Acetamide (aqueous), 50 %
+	Acetic acid, 10 %
+	Acetic acid, 2 %
-	Acetic acid, 90 %
+	Acetone
-	Acetyl chloride
+	Acrylonitrile
0	Air, liquid
+	Allyl alcohol
0	Aluminium chloride (aqueous), 10 %
-	Aluminium cleaner
+	Butanol
+	Butter
+	Butyl acetate
+	Butyl glycol
+	Butylloycolate
+	Butyl phthalate
0	Butyric acid
+	Calcium chloride, saturated solution
+	Calcium hydroxide, aqueous
+	Calcium hypochlorite
+	Camphor
+	Carbon disulphide

0	Aluminium sulphate (aqueous), 10 %	+	carbon dioxide gas
0	Aluminium salts of Mineral acids, 20 %	+	caustic potash (aqueous) 40 %
x	Ammonium carbonate (aqueous), 10 %	x	Potassium hydroxide solution, 10 %
+	Carbonated ammonia (aqueous), 10 %	0	Potassium hydroxide solution, 20 %
-	Ammonium chloride (aqueous), 10 %	+	potassium hydroxide solution, 50 %
-	Amylacetate, 100 %	0	caustic soda (aqueous), 50 %
+	Amyl alcohol	+	Cellulose lacquers
0	Aniline (aqueous), saturated solution	-	Chlorine
0	Anodizing baths (HNO3 -30 %/H2SO4 -10 %)	-	Chloramine
-	Aqua regia HCl/HNO3 (75/50 vol.)	-	Chlorethanal
+	Aromatics	-	Chlorinated water, saturated solution
0	Barium chloride (aqueous), 10 %	-	Chlorine
+	Barium salts of mineral acids	-	Chloroacetic acid (aqueous), 10 %
0	Barium sulphate (aqueous), 10 %	0	Bromomethane chloride, 98 %
0	Benzaldehyde	0	Chloroform
0	Benzoic acid (aqueous), 20 %	-	Chlorosulfonic acid (aqueous)
+	Benzyl alcohol		
+	Biphenyl		
0	Bitumen, DIN 51567		
-	Bleaching lye		
-	Bleaching lye (aqueous), 10 %		
0	Boric acid (aqueous), 10 %		
0	Spirit vinegar		
-	Hydrobromic acid (aqueous), 10 %		
-	Bromine (aqueous), 25 %		
-	Bromine vapours		

Risk	Damage to property as a result of incorrect installation
Warning symbol	TAKE CARE
Possible consequences of the incorrect action	Damage to property, measurement errors or jamming of the chain
Measure to mitigate risk	Gap of at least 0.5 m to the sprocket; installation location as free of vibrations as possible



The CCM can be used in the load run or slack span!

- The CCM-S should preferably be used in the load span.
- There is an elongation component in the load strand due to the force that does not exist in the lostrum; this elongation component makes up to 0.25%!
- The CCM-S is not allowed to be used as chain deflection or chain tensioner!
- The chain may only be detected in the CCM-S guided on both sides; the chain is best calmed down by the guidance on both sides!
- In addition, the CCM can be connected flexibly (elastically) in the slack span so that the CCM can absorb chain movements - thereby protecting the guiding track!
- All speed changes, delay effects etc., which always affect all chain links, are always neutralized by the two chain links in relation to each other, which means that we act independently of these effects. Only so-called micro-oscillations within a measurement have an influence on the measuring result!

The maximum cantilevered chain length before and after the CCM must be chosen in such a way that only a minimal weight load is applied to the CCM. If necessary, the weight of the chain must be intercepted by e.g. sprockets or guides!

Symbol	Meaning
	NOTE All the risks associated with the product that have been identified have been recorded in the form of a risk analysis/FMEA!

3 Transport / storage

During transport and storage, the devices must be protected against unacceptable stress (mechanical loads, temperature, humidity, aggressive atmospheric conditions).

The product is a precision measuring instrument and must be handled with due care.

The product can be damaged if handled incorrectly. Trouble-free operation is no longer guaranteed (see the section on "Technical condition").

3.1 Storage conditions

Es sind zusätzlich folgende Punkte zu beachten:

- Do not drop the product or subject it to heavy jolts.
- Do not store outdoors.
- Store in a dry, dust-free place.
- Do not expose the product to aggressive materials.
- Where possible, protect against direct sunlight (maximum permitted temperature may not be exceeded, even under direct sunlight).

3.2 Transport inspection


If the packaging is damaged, the product must be inspected to ensure that it functions properly.

This inspection must be carried out by specialist personnel (see the section on "Selection of staff...").

3.3 Packaging / re-packaging

When re-packaging the product, care must be taken to ensure that the device is not damaged.

If the product is damaged during this "re-packaging" process, it must be inspected by specialist personnel to ensure that it functions properly.

Symbol	Meaning
	<p>NOTE Handling packaging material The original packaging is made from recyclable material and can be disposed of accordingly.</p>

4 Description of the overall system



- 1 Sliding shoe**
- 2 Housing**
- 3 Mounting point Customer side (2x M6)**
- 4 IO-Link connection**
- 5 USB connection**

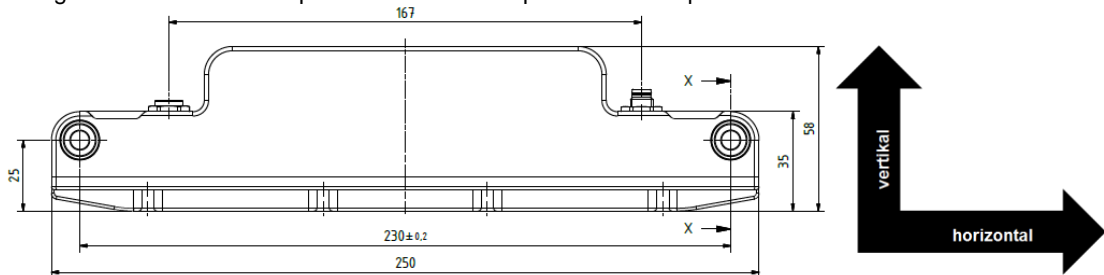
The CCM-S indicates the relative elongation compared to the nominal length of a stored standard chain according to ISO606. The measurement results of the CCM-S are a combination of measured and calculated values.

4.1 Construction and function

4.1.1 Factors influencing measurement

- The CCM-S detects the chain within the defined chain speeds (see chapter Technical data).
- Changing load directions and chain speeds have only a minor effect on the functionality and results of the CCM-S.
- Any change to the chain tension force which causes stretch under load and hence a change in the length affects the measurements. Under normal circumstances, however, this effect lies in the region <math><0.25\%</math> elongation (at a load of ~15 % of the yield strength of the chain). The same applies to temperature, i.e. the CCM system outputs an elongation value made up of wear, stretch under load and thermal stretch.
- Longitudinal vibrations do not present a problem in respect of measurement with the CCM system, as these represent a relative change in speed.
- Because the dimensions (particularly the nominal pitch) of different chain sizes vary, the correct size CCM model must be used for each chain size!
- Chains that have different nominal pitches within a single chain are not compatible with the CCM system!
- The CCM system provides averaged elongation values and is thus not capable of detecting and identifying sudden changes of length even up to the point at which the chain fails!

- The CCM system is always calibrated to the nominal pitch of a single chain size. The length tolerances of a chain can mean that an initial elongation value of up to 0.15 % can be displayed when testing a new chain. This value can even be a negative value!
- The measurement resolution or accuracy of the measurement results is 0.1%.
- Electrical parts should not be on the USB or IO-Link connecting cable.
- Live parts should not be at the USB connector
- The diagram below shows the preferred installation position for the product:



Other installation positions are not recommended.

4.1.2 Chain sizes

- Standard-Baugrößenbereich der CCM-Systeme kompatibel mit Baugrößen:
BS chains: 08B to 32B; ANSI chains: 40 to 160
- Each chain size requires a separate CCM system.
- The system is delivered calibrated and ready for use for every chain size.
- The system is supplied ready to use and calibrated to each chain size.
- The CCM system always detects only one strand of the chain. This means that the CCM system is not dependent on the design of the chain (simplex, duplex or triplex chains).
- It is possible to measure roller chains with attachments on one or both sides. In this event, however, iwis should carry out a technical feasibility analysis (CCM@iwis.com).
- The CCM system cannot be used to measure leaf chains. To do this, you can use the iwis wear gauge.

5 SLE function

5.1 General description

The SLE function (Segment Link Elongation) can be used to determine the elongation level of individual segments. This is particularly relevant for parallel running chains with or without attachments.

Using the SLE function, the complete chain can be broken down into individual segments - this increases the information content about the chain condition, e.g. whether much more elongated segments are contained than the average of the other segments.

In addition, this means that in case of maintenance, it is not necessary to replace the complete chain, but only individual segments of it. In order to enable the SLE function or to index the chain, magnets must be attached to the outer links (single chain) on both sides of the chain. (For double and triple chains, please consult iwis).

The SLE function only works correctly with chains that always move in the same direction; a reversal of the direction of rotation (e.g. in lifting applications) is not compatible with the SLE function!

The SLE results can be retrieved via IO-Link as well as using the CCM-Monitor software.

5.2 Functionality

The SLE function requires an index on the chain. This index is made by magnets, which must be attached on both sides to two opposite outer plates of a chain. The two magnets generate a magnetic field, which is detected by a

HALL sensor in the CCM-S. The HALL sensor is used to detect the magnetic field. When the magnet is passed through the Hall sensor, a certain magnetic strength must be present so that it is recognized as an index mark.

As soon as this index is recognized, each chain link is counted, and the average elongation value of this chain link is stored in the memory.

When a chain is initially commissioned for the first time, all values must first be initialized using the "new chain" function. The index must then be traversed at least twice so that the number of chain links can be determined; no SLE data is available previously.

5.3 Mounting Magnet

The two magnets are attached to two opposite outer plates of a chain. A special adhesive must be used to attach the magnet, regardless of the material of the outer link.

The magnetic field strength of these magnets must be large enough to be reliably detected by the HALL sensor.

For the magnets there is the following recommendation:

Description	Disc Magnet Designation
CCM-S-08B IWIS	Ø6,0x2,0mm N45 nickel – holds 700g
CCM-S-40 IWIS	Ø6,0x2,0mm N45 nickel – holds 700g
CCM-S-10B IWIS	Ø8,0x2,0mm N45 nickel – holds 1kg
CCM-S-50 IWIS	Ø8,0x2,0mm N45 nickel – holds 1kg
CCM-S-12B IWIS	Ø10,0x2,0mm N35 nickel – holds 1kg
CCM-S-60 IWIS	Ø10,0x2,0mm N35 nickel – holds 1kg
CCM-S-16B IWIS	Ø13,0x2,0mm N45 nickel – holds 1,5kg
CCM-S-80 IWIS	Ø13,0x2,0mm N45 nickel – holds 1,5kg
CCM-S-20B IWIS	Ø16,0x4,0mm N45 nickel – holds 3,4kg
CCM-S-100 IWIS	Ø16,0x4,0mm N45 nickel – holds 3,4kg
CCM-S-24B IWIS	Ø16,0x4,0mm N45 nickel – holds 3,4kg
CCM-S-120 IWIS	Ø20,0x5,0mm N42 nickel – holds 6,1kg
CCM-S-28B IWIS	Ø20,0x5,0mm N42 nickel – holds 6,1kg
CCM-S-140 IWIS	Ø25,0x5,0mm N50 nickel – holds 8,6kg
CCM-S-32B IWIS	Ø25,0x5,0mm N50 nickel – holds 8,6kg
CCM-S-160 IWIS	Ø25,0x5,0mm N50 nickel – holds 8,6kg

Please contact iwis for mounting the magnets.

The following picture shows an example of the mounting position of the magnet.

The upper edge of the disc magnet should be fixed flush with the upper edge of the outer flap (see red dotted line).



Magnet is mounted flush with the upper edge of the outer link plate.

6 Scope of delivery

The scope of delivery of the system depends on the chosen configuration, i.e. on the selected components. The system is made up of the following components:


Quantity	Description
1x	CCM-S
4x	Mounting stripes
1x	USB protection cap


6.1 Tools required

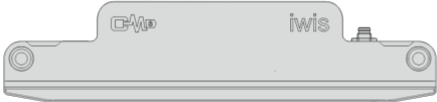
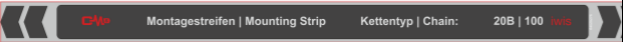
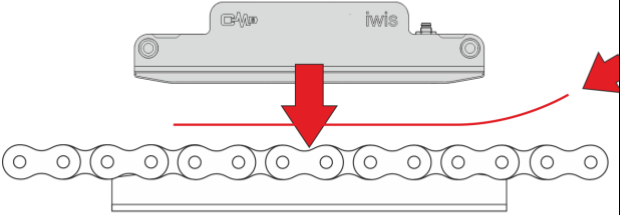
Quantity	Description
1x	IODD - Description file for IO-Link Device
1x	IO-Link connecting cable
1x	Operating- and mounting instructions
1x	USB connecting cable

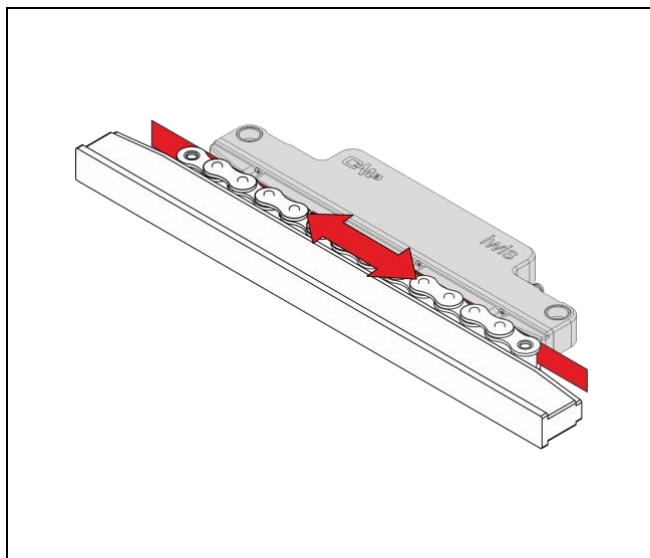
7 Installation and commissioning

7.1 Installation

Risk	Reactivation of the chain drive
Warning symbol	
Possible consequences of the incorrect action	Warning: Risk of death or injury to the user or third party or impairment of tangible assets
Measure to mitigate risk	The chain drive and associated mechanical components must be safeguarded in such a way that it is not possible to power up or run the machine during installation.

	<ul style="list-style-type: none"> • Assembly is the responsibility of the customer. The supplier or manufacturer accepts no liability whatsoever for improper installation or for the direct or indirect consequences thereof. • Metal parts and magnets can influence the sensor. • Before mounting, make sure that the corresponding CCM-S corresponds to the chain size to be measured. • The illustrations correspond to a schematic view and serve to understand the procedure.
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	<ol style="list-style-type: none"> 1. Pick up the scanning module.
	<ol style="list-style-type: none"> 2. Take the mounting strip by hand according to the type of chain.
	<div style="background-color: #f08000; color: white; padding: 5px; display: inline-block;">⚠ WARNING</div> <div style="background-color: #0056b3; color: white; padding: 5px; display: inline-block;">TAKE CARE</div> <p>Warning: Danger to life and limb of the user or third parties or damage to property. If the chain run is not guided, the chain may can't and thus endanger the life and limb of the user or third parties or impair material assets.</p> <ul style="list-style-type: none"> ▶ The chain must be guided at the sensor. ▶ Sensor must be surrounded by guide rails in all directions. ▶ The guide must be checked regularly.

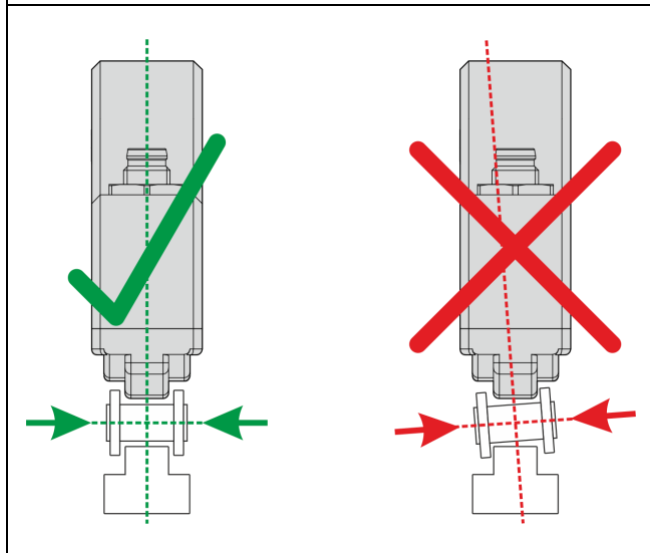


- ▶ Permanent contact between chain and sensor is not permitted.
- ▶ The trouble-free running of the chain must be guaranteed.

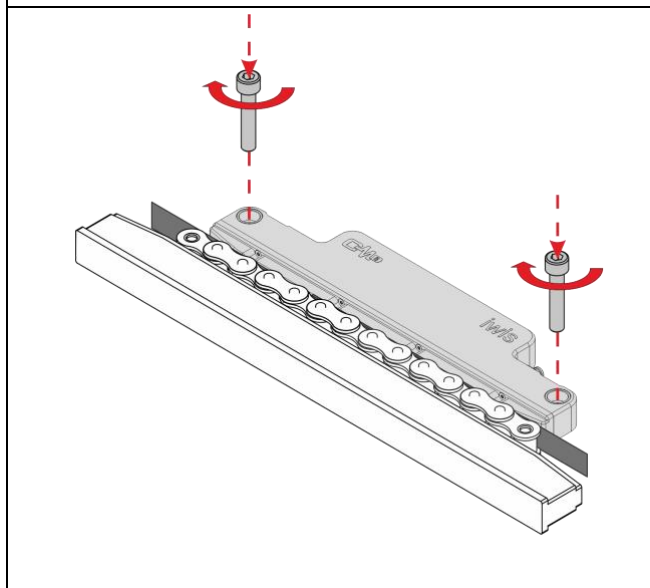


Notice:

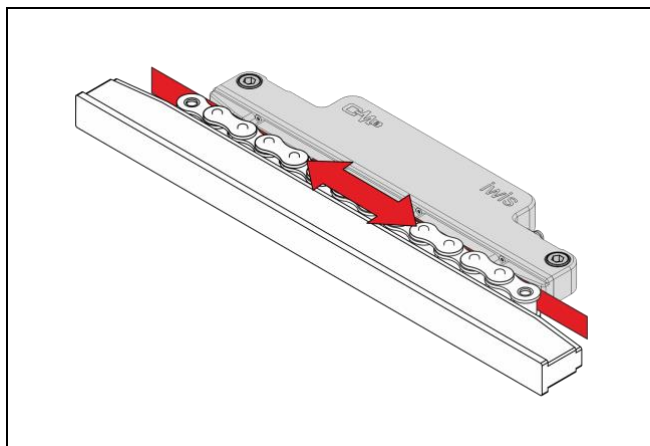
- ▶ Sensor is not a replacement for guide rails.
- ▶ Sensor must not be used as chain guide and/or chain tensioner.



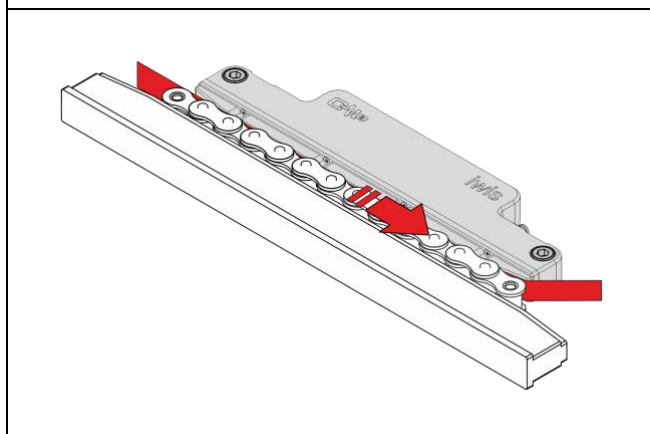
3. Fix the scanning module on the chain so that the mounting strip can still be moved easily. In case of doubt, readjust the scanning module and check again.
4. Check the chain run and chain tension. The chain must run along the guide.



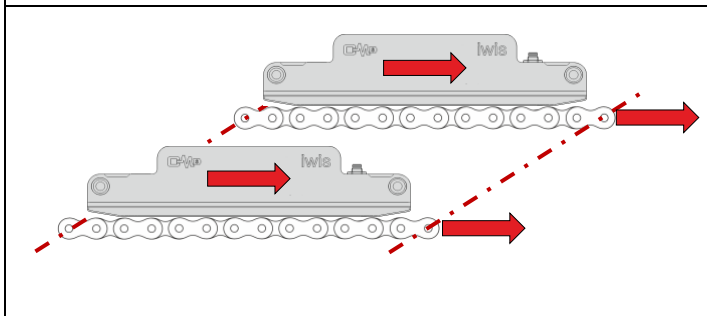
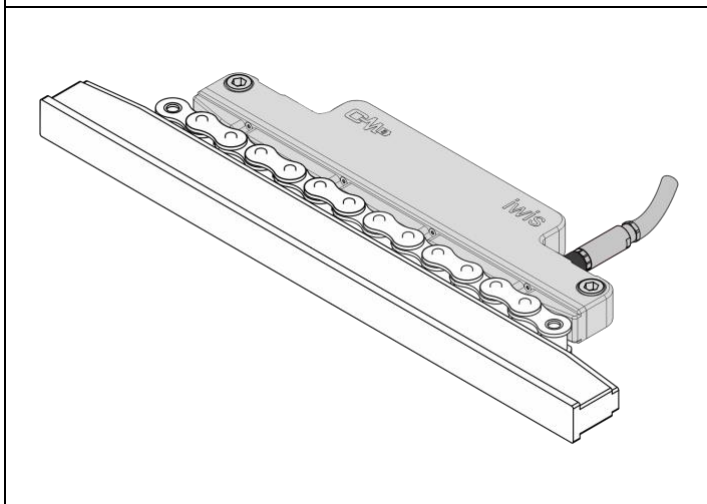
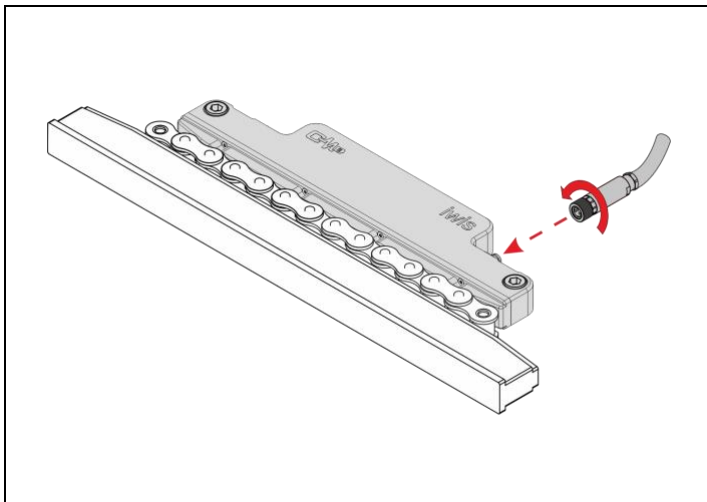
5. Tighten the two M6 screws to 10 Nm. The tightening torque applies exclusively to strength class 8.8.



6. The mounting strip shall be easy to move. If in doubt, readjust the scanning module and check again.



7. Remove the mounting strip by pulling it out under the scanning module.



TAKE CARE

Warning: Damage to thread.
The use of tools can lead to the thread being overtightened.

- ▶ Assembly by hand

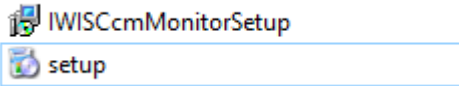
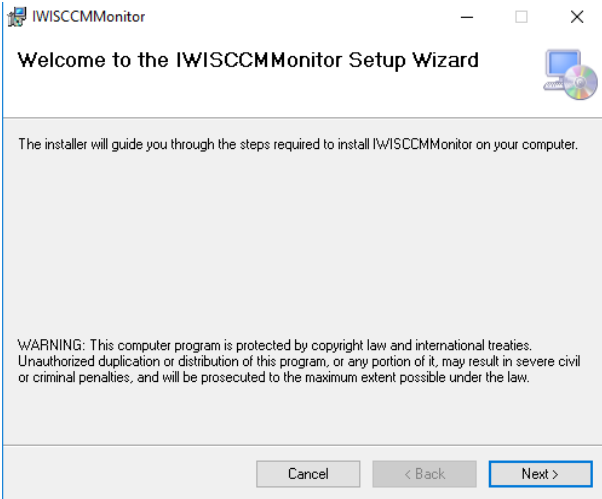

8. Now connect the wiring. Tighten the cable connections by hand.

TAKE CARE

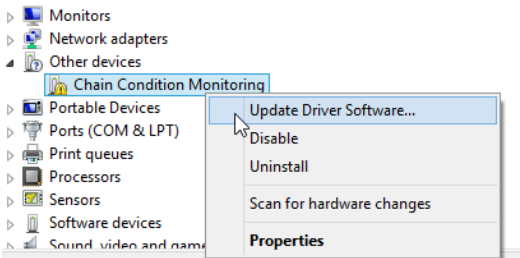
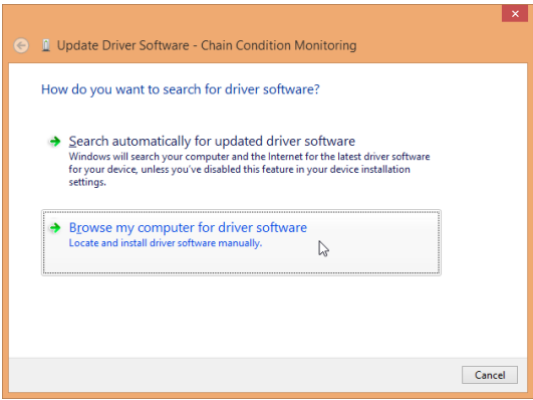
When installing in parallel running chain strands and using two CCM-S, it is recommended to align both CCM-S in the same running direction so that the front sides point in the same direction.

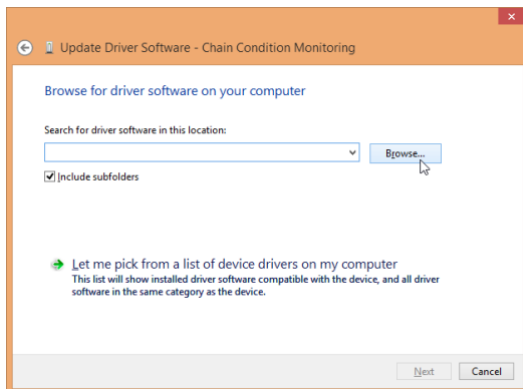
7.2 Software Installation

7.2.1 Installing iwis-CCM Monitor on the PC

	<ol style="list-style-type: none"> 1. Start your PC (see chapter "Required tools").
	<ol style="list-style-type: none"> 2. Bring your PC into an operational state. Download the CCM-S software package under www.iwis.com/ccm-s to your PC locally. Please unpack the downloaded files with a suitable program.
	<ol style="list-style-type: none"> 3. Navigate to the CCMSetup directory. Run the "Setup.exe" application by double-clicking it.
	<ol style="list-style-type: none"> 4. Follow the software installation steps.
	<ol style="list-style-type: none"> 5. The following shortcut will be created on your desktop after successful installation.

7.2.2 Installing the iwis-CCM Monitor USB driver on the PC

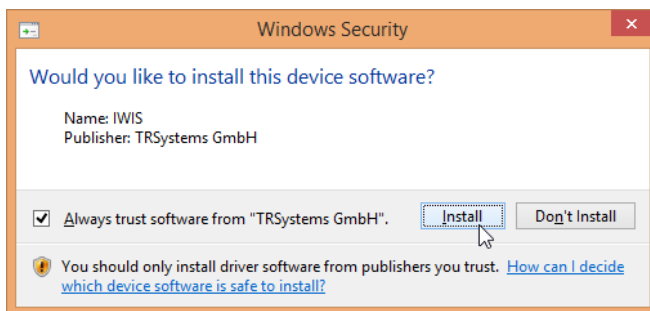
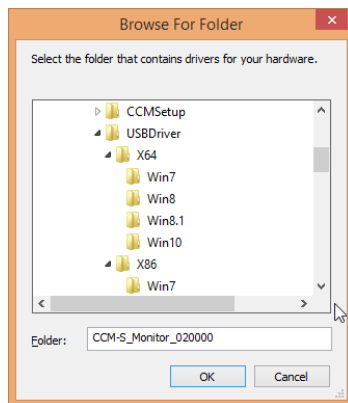
	<ol style="list-style-type: none"> 1. Start your PC (see chapter "Required tools").
	<ol style="list-style-type: none"> 2. Bring your PC into an operational state. Download the CCM-S software package under www.iwis.com/ccm-s to your PC locally. Please unpack the downloaded files with a suitable program.
	<ol style="list-style-type: none"> 3. Connect your PC to the CCM-S. Make sure that the CCM-S is connected to a power supply. In Windows, navigate to the Device Manager.
	<ol style="list-style-type: none"> 4. <Right-click> on "Chain Condition Monitoring". Then select "Update driver software".
	<ol style="list-style-type: none"> 5. Select "Search for driver software on your computer" from the menu.



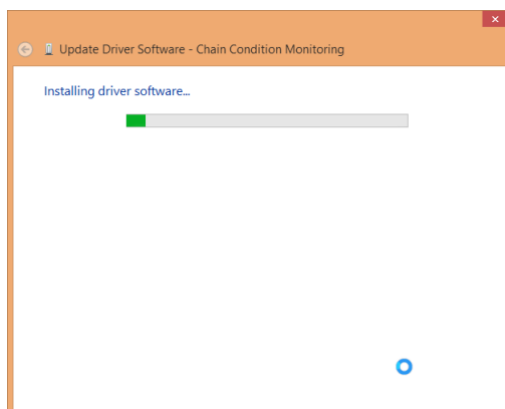
6. Use the "Browse" button to navigate to the "USBDriver" folder and select it.

Make sure that a check mark is set for "Include subfolders".

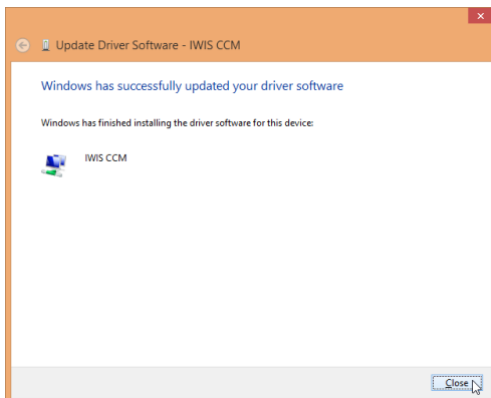
Confirm with "Next".



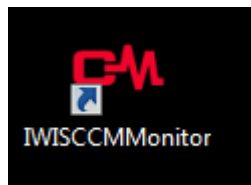
7. Select "Install driver software anyway".



8. Now the drivers will be installed. This may take a moment.

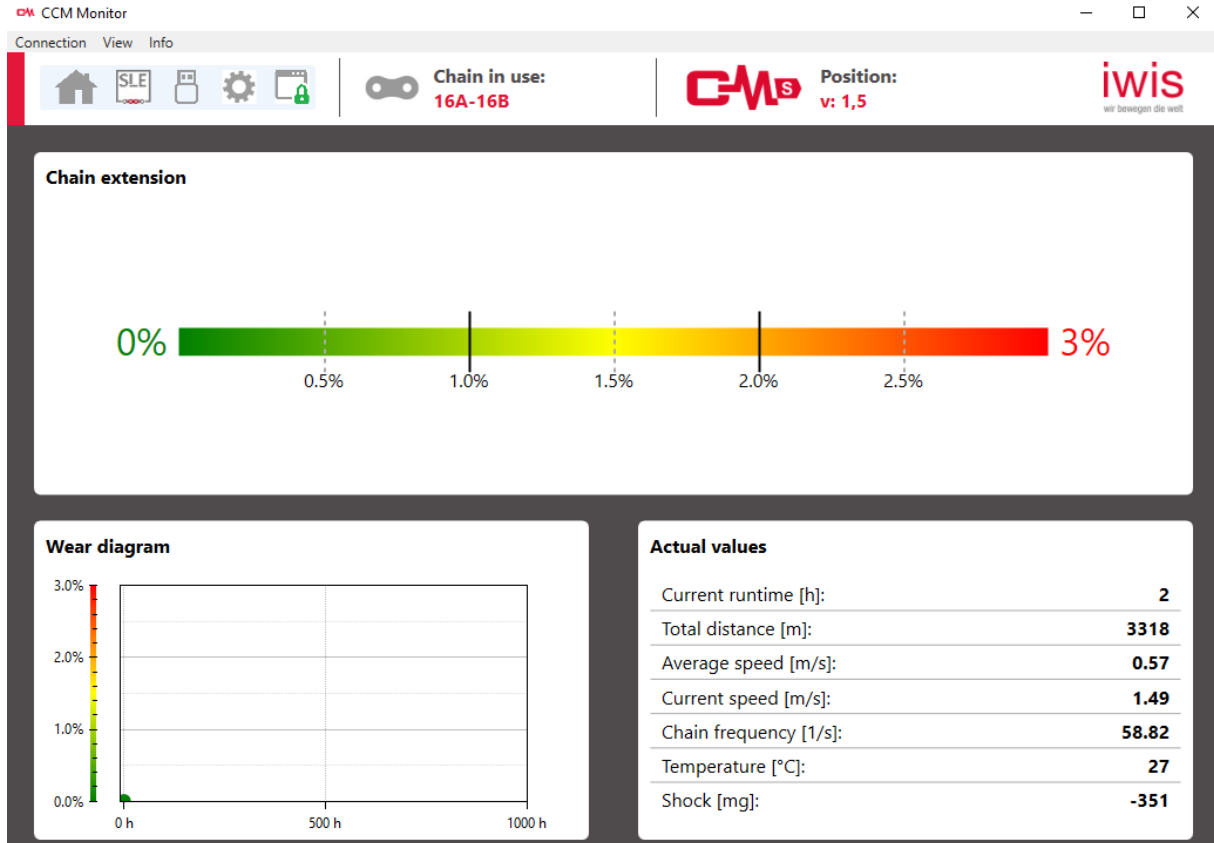


9. The drivers have been successfully installed. Restart the PC.










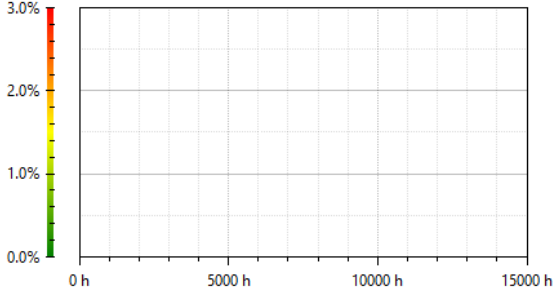
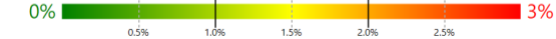
10. Now start the visualization with a <double click> on the link "IWISCCMMonitor".

After starting the software "IWISCCMMonitor", the following start screen appears:




Homescreen of the IWIS CCM Monitor Software



Symbol	Display	Description
	User (View ->User)	The symbol takes you to the main page.
	SLE	This symbol takes you to the Single Link Diagram display.
	Data (Connection -> Connect)	Use the USB symbol to read in the current measurement data.
	Settings (View -> Settings)	With this symbol you can select the menu language.

	<p>Login (View -> Login)</p> <p>This icon takes you to the user logon screen.</p>
 <p>Chain in use:</p>	<p>Chain type</p> <p>Displays the chain type.</p>
 <p>Position:</p>	<p>Position</p> <p>Displays the selected position description.</p>
<p>Wear diagram</p> 	<p>Wear diagramm</p> <p>Wear diagramm of the chain</p>
<p>Chain extension</p> 	<p>Chain extension</p> <p>Visualisation of the chain length in %.</p>


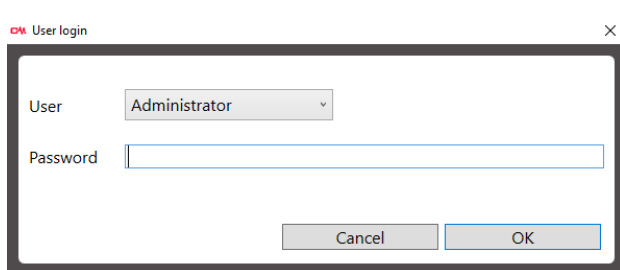
Via the menu item "Info" you get information about the status of the software and about the device!

Symbol	Meaning
	<p>NOTE The CCM-S has an internal memory located on the electronics inside the case. The elongation values and operating times are stored there.</p> <p>The elongation values are stored every 6 minutes - the values shown on the scale in the software are float values stored in another "side" memory.</p> <p>If the CCM-S is in the chain drive, it does not matter whether the laptop is connected or not - the measured data are permanently stored in the CCM.</p> <p>With respect to the x-y diagram shown in the software, the operating hours are copied from the internal memory to the diagram when a length increment of 0.1% is exceeded.</p> <p>Thus the maximum standard number of stored and displayed values in the diagram is 30 (resulting in a maximum elongation of $30 \times 0.1\% = 3\%$).</p>

7.3 Establishing a PC connection with the CCM-S

	1. Click on the USB icon.
	2. You can recognize a successful connection by a green tick in the USB symbol.

7.4 Setting up a new chain (also initial setup)

	1. Start the application. Establish a connection with the CCM-S (see chapter 7.1). Then log on to the system by clicking on the USB symbol.
	2. Select " Administrator " from the User menu. Enter " admin " as the password and confirm with "ok".

3. Nun befinden Sie sich im Administrationsbereich

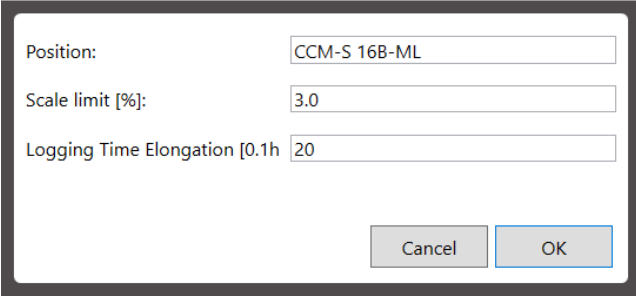
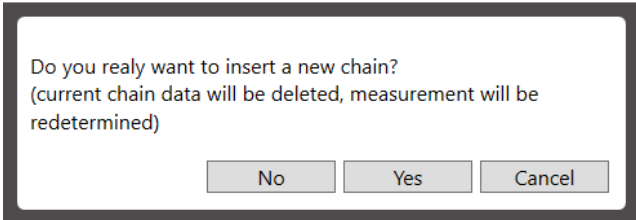

Symbol	Meaning
	<p>NOTE Before you set up a new chain, we recommend that you save the error log. See Chapter 7.5 "Reading/saving/resetting the error log".</p>



Position:

New chain

Start

4. Press the "Start" button to confirm the start of the new measurement series to the program

	<p>5. Now enter the desired values here. "Position" describes the location where the CCM-S will be used. With "Scale limit" the limit value for wear can be set. The limit is set to 3% by default. With "Logging time elongation" you can set the time interval in which the elongation value of the chain should be stored. Time in 0.1h.</p> <p>Confirm your entries with "OK".</p>
	<p>6. All data of the previous chain are deleted with "Yes"!</p>
	<p>7. Please log out again. To do this, click on the registration symbol again.</p>

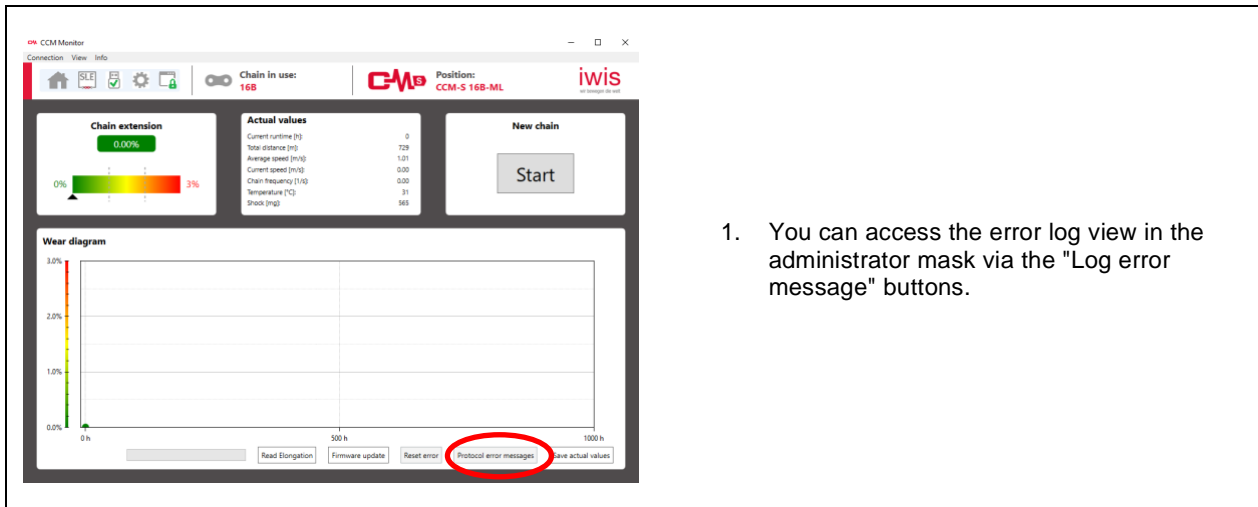
Symbol	Meaning
	NOTE A permanent visualization via your PC is not intended.
	NOTE Due to the length tolerances of the chain, an initial elongation value of up to +0.15% can be displayed when testing a new chain, or the value can even be in the minus range.

7.5 Reading/ Saving / Resetting the Error Log

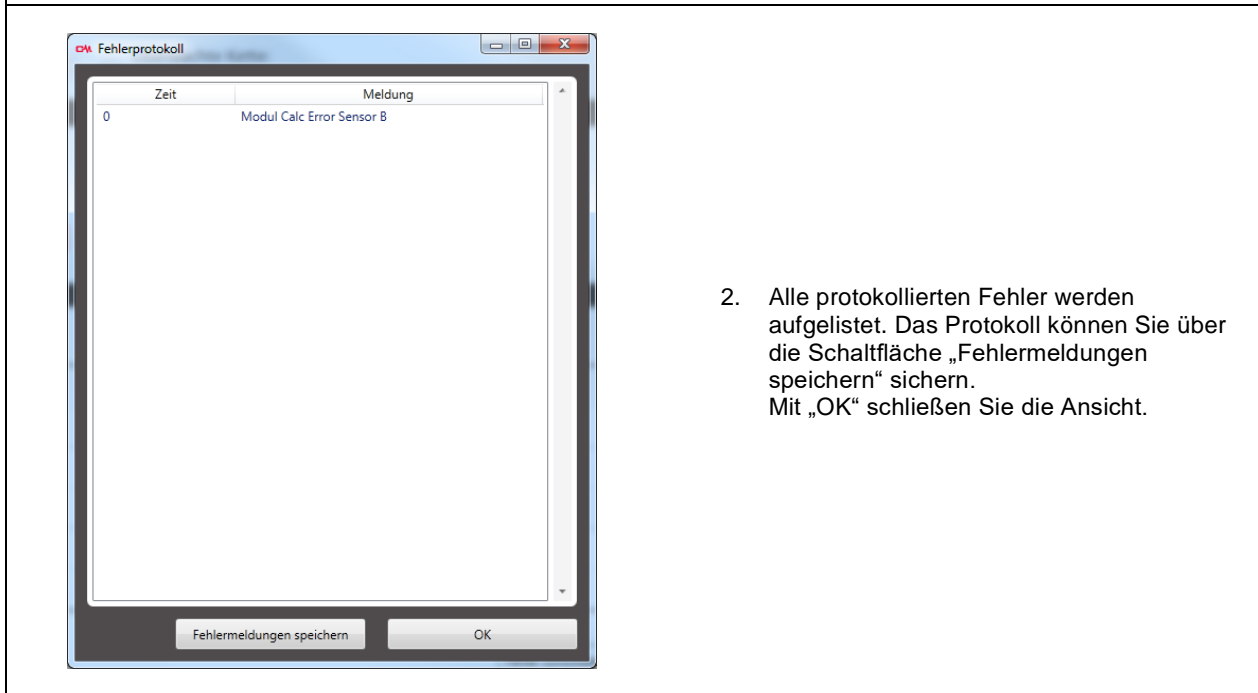
To view the error log, the following conditions must be met:

- The CCM-S must be connected to the PC ready for operation via the USB cable
- An error must be logged (otherwise the button is grayed out)
- You must be logged on as an administrator in the iwis CCM Monitor software

If these conditions apply, proceed as follows:



1. You can access the error log view in the administrator mask via the "Log error message" buttons.



2. Alle protokollierten Fehler werden aufgelistet. Das Protokoll können Sie über die Schaltfläche „Fehlermeldungen speichern“ sichern. Mit „OK“ schließen Sie die Ansicht.

7.6 Error log

Error messages / cause	Fault solution	Modulnr.	Bitdefinition
Modul Database Error No Header No parameter header detected in flash	System error. Contact manufacturer.	1	0x00000004
Modul Database Error Wrong Hash Checksum of the parameter data in the flash not ok	System error. Contact manufacturer.	1	0x00000008
Database Error No Backup Header Module No parameter header detected in backup flash	System error. Contact manufacturer.	1	0x00000010
Database Error Wrong Backup Hash Checksum of the parameter data in the backup flash not ok	System error. Contact manufacturer.	1	0x00000020
Modul Database Error Allocation Fail Error in the internal database	System error. Contact manufacturer.	1	0x00000040
Modul Database Error No EEPROM Header No parameter header detected in EEPROM	System error. Contact manufacturer.	1	0x00000080

Modul Database Error Wrong EEPROM Hash Checksum of the parameter data in the EEPROM not ok	System error. Contact manufacturer.	1	0x00000100
Database Error No Backup EEPROM Header No parameter header detected in backup EEPROM	System error. Contact manufacturer.	1	0x00000200
Module Database Error Wrong Backup EEPROM Hash Checksum of parameter data in backup EEPROM not ok	System error. Contact manufacturer.	1	0x00000400
Modul Main Error Systick Systick initialization error	System error. Contact manufacturer.	2	0x00000004
Modul SensorCtrl No Lin Table Linearization table not available	System error. Contact manufacturer.	5	0x00000010
Modul SensorCtrl Error Position Sensor Error Sensor signal	Check the chain guide. Distance to the chain may be too large.	5	0x00000020
Modul Calc Error Single Link Index Number of chain links with Single Link incorrect	Check the chain guide. Distance to the chain may be too large. Check magnet for single link detection	6	0x00000010
Modul Calc Error Single Link Count Number of chain links could not be determined with Single Link	Kettenführung prüfen evtl. Abstand zur Kette zu groß. Magnet für Single Link Erkennung prüfen	6	0x00000020
Modul OWI Address Error Incorrect address	System error. Contact manufacturer.	7	0x00000004
Modul OWI Read Error Read error	System error. Contact manufacturer.	7	0x00000008
Modul OWI Different Data Sensor 1 Unequal data in position sensor 1	System error. Contact manufacturer.	7	0x00000010
Modul OWI Different Data Sensor 2 Unequal data in position sensor 2	System error. Contact manufacturer.	7	0x00000020
Modul EEPROM Error Read Read error EEPROM	System error. Contact manufacturer.	9	0x00000004
Modul EEPROM Error Write Write error EEPROM	System error. Contact manufacturer.	9	0x00000008
Modul EEPROM Error Flush Initialization error EEPROM	System error. Contact manufacturer.	9	0x00000010
Modul EEPROM Error Index Overflow Index out of range	System error. Contact manufacturer.	9	0x00000020
Modul EEPROM Error Compare Compare error EEPROM	System error. Contact manufacturer.	9	0x00000080
Modul Diagnosis Error Memory Full Diagnostic memory full	System error. Contact manufacturer.	10	0x00000004
Modul Diagnosis Error Init Failed Diagnostic data could not be initialized	System error. Contact manufacturer.	10	0x00000008
Module Diagnosis Error Init Chain Failed Diagnostic data chain could not be initialized	System error. Contact manufacturer.	10	0x00000010

Modul Safety Error Missing Flags Error flag not exist	System error. Contact manufacturer.	11	0x00000004
Modul Analog Pos-Sensor 1 Error Error position sensor 1	System error. Contact manufacturer.	12	0x00000004
Modul Analog Pos-Sensor 2 Error Error position sensor 2	System error. Contact manufacturer.	12	0x00000008
Modul Analog Hall-Sensor 1 Error Error hall sensor 1	System error. Contact manufacturer.	12	0x00000008
Modul LogElonc Error Init Initialization of logging chain not ok	System error. Contact manufacturer.	13	0x00000008
Modul Accel Error Read Read error of accelerometer	System error. Contact manufacturer.	14	0x00000004
Modul Accel Error Write Write error of accelerometer	System error. Contact manufacturer.	14	0x00000008

Contact the manufacturer at: CCM@iwis.com

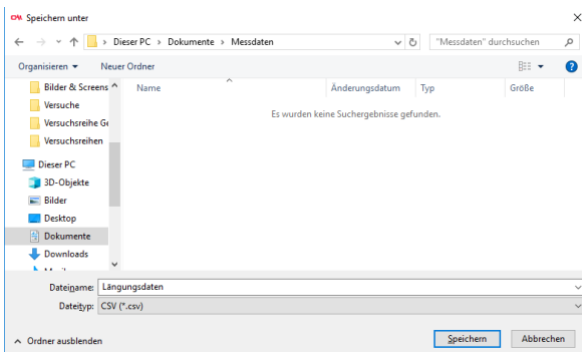
7.7 Reading out elongation data locally

You can use the following steps to save the elongation data in an Excel table.

1. Make sure that you are in the administrator area. See steps 1 and 2 of chapter 7.4..

Read Elongation

2. Then <click> on the "Read elongation" button.



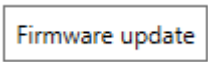
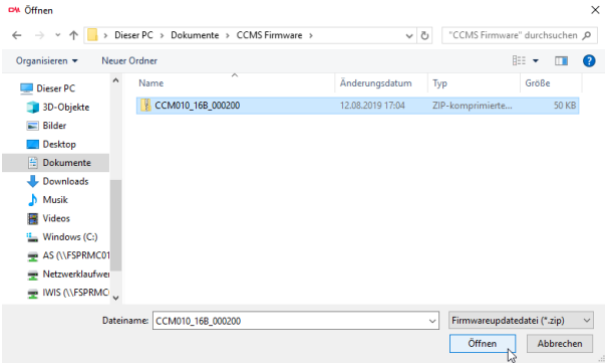
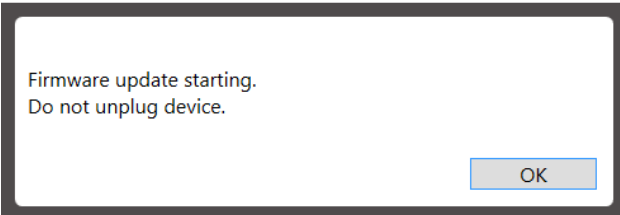
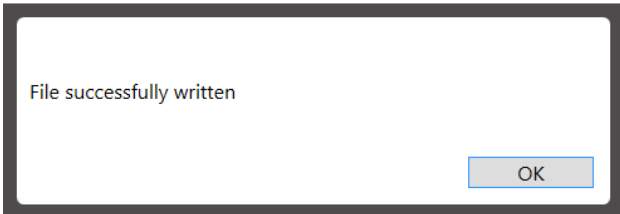
3. Select a storage path and a name for the table. Then <click> on "Save".

Runtime[hrs]	Elongation[%]
1116	0,541
1114	0,542
1112	0,542
1110	0,541
1108	0,542
1106	0,54
1104	0,537
1102	0,538

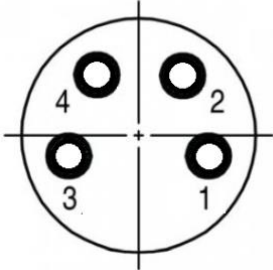
4. The saved file can then be opened. The elongation values are read out from the beginning of the recording in the cycle that was specified at the start of a new chain (see Chapter **Error! Reference source not found.**).

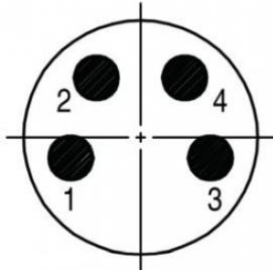
7.8 Updating the CCMS firmware

You can use these steps to update the firmware of the CCMS.

	<ol style="list-style-type: none"> 1. Make sure that you are in the administrator area. See steps 1 and 2 of chapter Error! Reference source not found..
	<ol style="list-style-type: none"> 2. Then <click> on the button "Firmware update".
	<ol style="list-style-type: none"> 3. In the dialog window, select the appropriate .zip file from the current software package (see Chapter 7.2.2) in the "CCMS Firmware" folder. This file must not be unpacked!
	<ol style="list-style-type: none"> 4. Make sure that your PC/Notebook has sufficient power and <click> on "OK". The update will now start.
	<ol style="list-style-type: none"> 5. As soon as the update process is finished, a message is displayed. This is ended by <clicking> on "OK". The update is now complete.

7.9 Connection / pinout

Pinout chart, connector M8, 4-pole, view from socket side (USB)	Pin	Signal	
	1	+5V	A pre-assembled cable with M8 plug and USB plug is used for USB.
	2	USB-	
	3	USB+	
	4	GND	

Pinout chart, connector M8, 4-pole, view from pin end (IO-Link)	Pin	Signal	
	1	L+ (18 – 30V DC)	
	2	NC	
	3	L- (GND)	
	4	C/Q (IO-Link signal)	

8 IO-Link information

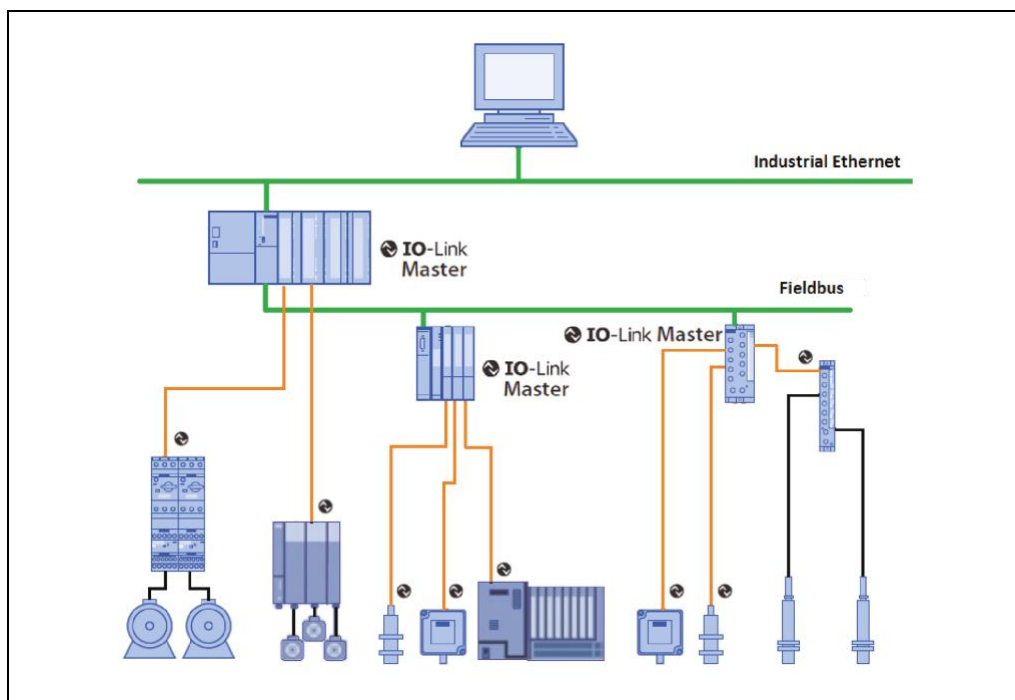
IO-Link is a serial, digital communication protocol for use in industrial environments. It is used to connect sensors, actuators and also measuring systems (IO Link devices) to an automation system. IO-Link digitizes the "last meter" in communication with sensors and actuators.

IO-Link is standardized in IEC 61131-9. Part 9 describes IO-Link under the designation "Single-drop digital communication interface for small sensors and actuators" (SDCI).

Where previously only binary switching states (On/Off) or analog signals were transmitted, status information can now also be read from the IO-Link device and parameterization information can be transmitted to the IO-Link device. This circumstance now also enables problem-free connection of the measuring system.

IO-Link is not another bus system, but a point-to-point connection between the IO-Link device and a connection unit, the IO-Link master.

The IO-Link master communicates with the IO-Link devices, collects their data and transmits them to the higher-level bus system (fieldbus) or to the Industrial Ethernet.



System overview [Source: IO-Link Firmengemeinschaft]

IO-Link Firmengemeinschaft

c/o PROFIBUS Nutzerorganisation e.V. (PNO),
Haid-und-Neu-Str. 7,
D-76131 Karlsruhe,

<http://www.io-link.com/>

Tel.: ++ 49 (0) 721 / 96 58 590

Fax: ++ 49 (0) 721 / 96 58 589

E-mail: <mailto:info@io-link.com>

8.1 Installation

8.1.1 General regulations

- Separate laying of power and signal lines. During installation, the national safety and installation guidelines for data and power cables must be observed.
- Separation or differentiation of the measuring system from possible interfering transmitters.
- Observe the manufacturer's instructions when installing inverters, shielding the power cables between the frequency inverter and the motor.
- To ensure safe and trouble-free operation, the following standards and guidelines must be observed:
 - IO-Link Planning Guideline, PNO Order No.: 10.911
 - IEC 60947-5-2, Low-voltage switchgear and controlgear
 - EMC directive
- It is recommended to prepare a visual inspection with protocol after completion of the assembly work.

8.1.2 IO-Link

The connection from the measuring system to the IO-Link master is made as a point-to-point connection and is implemented via a three-core unshielded control cable.

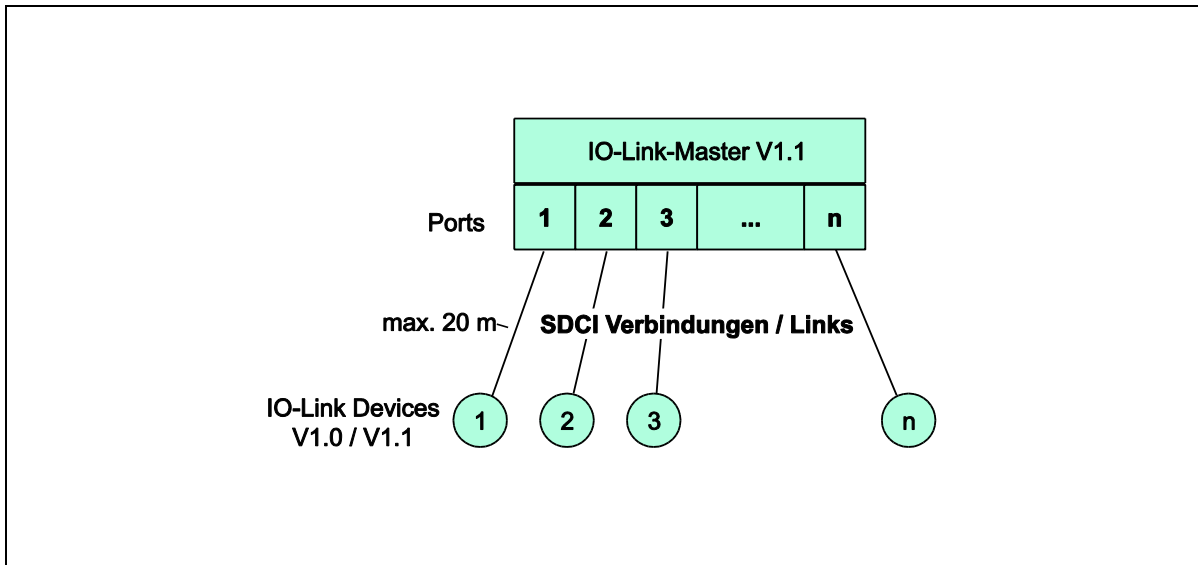
The cable length between the IO-Link master and the IO-Link device (per device) is limited to a maximum of 20 m. A minimum cross section of 0.35 mm² is recommended.

The CCM-S is connected via a 4-pole M8 connector.

Of the three wires of the control cable, two wires are required for the supply voltage and one wire for the IO-Link communication connection. The 0 V supply cable is also the reference potential of the IO-Link communication connection.

According to the IO-Link specification, the CCM-S with this connection variant is compatible with "port class A". The maximum current consumption of these devices is specified on ≤ 200 mA.

The CCM-S supports a transmission rate of 230.4 kbit/s, which corresponds to the SDCI communication mode "COM3".



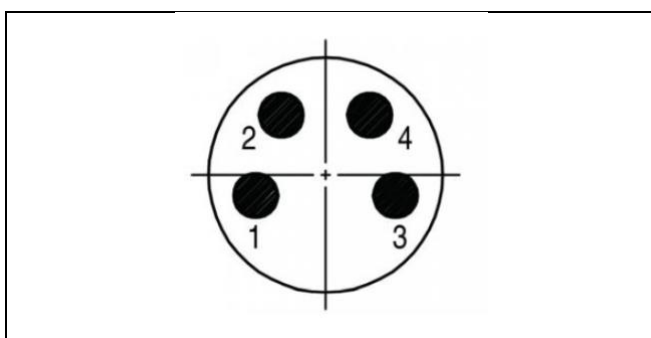
SDCI Topology

The CCM-S occupies a total of 16 bytes of input data via the cyclic data.

Process data structure:

- IN: 2-Byte Status (Status)
- IN: 2-Byte chain lengthening in 0,01% (Chain Length)
- IN: 4-Byte Number of measured chain links (Chain Link Count)
- IN: 2-Byte Maximum elongation value within the chain (Max. Single Link Length)
- IN: 2-Byte Position of maximum lengthening (Max. Single Link Length Position)
- IN: 4-Byte Conter Single Link Index (Chain Single Link Index Count)

8.1.3 Connection



M8 connector

Pin	Designation	Description
1	L +	Supply voltage +, 18...30 V DC
2	N.C.	Not connected (operating mode: IO-Link only)
3	L -	Supply voltage -, 0 V
4	C/Q	SDCI communication signal (IO-Link signal)

8.2 Device profile / Function Classes

The parameter contains the device profile supported by the measurement system and the function classes that specify the scope of functions of the measurement system.

Index	Subindex	Name	Length	Type	Access
0x000D	0	Profile characteristics	16 Bit	ArrayT	ro
	1	DeviceProfileID	16 Bit	UIntegerT16	ro

Subindex 1, DeviceProfileID:

0x4000: Identification and Diagnosis (Common Profile)

Defines and standardizes the internal device structure (device model) and contains the following function classes:

- 0x8000: Device Identification
- 0x8002: ProcessDataVariable
- 0x8003: Diagnosis
- 0x8100: Extended Identification

8.3 Commissioning

8.3.1 IO-Link Device Description File

The CCM-S also provides an electronic device description, the so-called "IODD file" (**IO Device Description**). This file is required for the IO-Link system integration and for the commissioning of the measuring system.

The IODD file is XML-based and can be read by any **IO-Link configuration tool**.

Download: www.iwis.com/ccm-s

8.3.2 Device identification

Each IO-Link device has a device identification. It consists of a company ID, the VendorID, and a manufacturer-specific part, the DeviceID. The VendorID is assigned by the PNO and has been assigned to iwis antriebssysteme GmbH & Co. KG has the value 0x025C, the DeviceID has the value 0x01.

During start-up, the configured device identification is checked and thus possible errors in the project engineering are detected.

8.3.3 Starting the IO-Link System

If the CCM-S is connected to an IO-Link master and the operating mode IO Link is set, the IO-Link master tries to communicate with the connected measuring system. To do this, the IO-Link master sends a wake-up request and waits for the response of the measurement system.

After receiving the answer, the data transmission rate COM 3 = 230.4 kBaud is set by the IO-Link master and the communication is started. First, communication parameters are exchanged and, if necessary, parameters stored in the system are transferred to the measuring system. Then the cyclic data exchange of the process data and the value status is started.

8.3.4 Process Input Data

When integrating the CCM-S into your higher-level system (e.g. PLC), please make sure to specify the correct index at the beginning when the data is queried. The following data is output via the process input data.

Index	Subindex	Name	Length	Type	Access
0x0028	0	ProcessDataInput	128 Bit	RecordT	ro
		Status	16 Bit	UIntegerT16	ro
		Chain Length	16 Bit	IntegerT16	ro
		Chain Link Count	32 Bit	UIntegerT32	ro
		Max. Single Link Length	16 Bit	IntegerT16	ro
		Max. Single Link Length Position	16 Bit	UIntegerT16	ro
		Chain Single Link Index count	32 Bit	UIntegerT32	ro

Structure

Byte	Bit	Process data
X+0	2 ¹⁵ -2 ⁸	Status
X+1	2 ⁷ -2 ⁰	Status
X+2	2 ¹⁵ -2 ⁸	Chain Length
X+3	2 ⁷ -2 ⁰	Chain Length
X+4	2 ³¹ -2 ²⁴	Chain Link Count
X+5	2 ²³ -2 ¹⁶	Chain Link Count
X+6	2 ¹⁵ -2 ⁸	Chain Link Count
X+7	2 ⁷ -2 ⁰	Chain Link Count
X+8	2 ¹⁵ -2 ⁸	Max. Single Link Length
X+9	2 ⁷ -2 ⁰	Max. Single Link Length
X+10	2 ¹⁵ -2 ⁸	Max. Single Link Length Position
X+11	2 ⁷ -2 ⁰	Max. Single Link Length Position
X+12	2 ³¹ -2 ²⁴	Chain Single Link Index count
X+13	2 ²³ -2 ¹⁶	Chain Single Link Index count
X+14	2 ¹⁵ -2 ⁸	Chain Single Link Index count
X+15	2 ⁷ -2 ⁰	Chain Single Link Index count
X+16	2 ¹⁵ -2 ⁸	Average Acceleration
X+17	2 ⁷ -2 ⁰	Average Acceleration
X+18	2 ¹⁵ -2 ⁸	Maximum Acceleration
X+19	2 ⁷ -2 ⁰	Maximum Acceleration

Process Input Data - Status:

Status word contains status and error bits from the system.

Warning-/Error bits, bit 8...15

0x80	Error
0x20	Warning
0x10	Report

Status bits, bit 7...0

Process Input Data – Chain Length:

The elongation is output as a signed two's complement value in 0.01% steps.

Process Input Data – Chain Link Count:

The number of chain links passed through is output.

Process Input Data – Max. Single Link Length:

The maximum lengthening within the chain is output as a signed two's complement value in 0.01% steps. In comparison to the SLE values in the parameter data, the maximum value over the entire runtime of the chain is output here.

Process Input Data – Max. Single Link Length Position:

Position of the chain link with the maximum elongation. In comparison to the SLE values in the parameter data, the maximum value over the entire runtime of the chain is output here.

Process Input Data – Chain Single Link Index count:

The number of runs of the single-link index marker is output.

Process Input Data – Average Acceleration:

Average acceleration or shock to the CCM-S in mg.

Process Input Data – Maximum Acceleration:

Maximum acceleration or shock on the CCM-S. Is reset to 0 after 10000 chain links and new measurement is started.

8.4 Parameterization

Parameter data are exchanged acyclically and only on request of the IO-Link master. The parameter data are addressed via a so-called index and subindex.

This is a confirmed service. The IO-Link master specifies in its request the parameter Index, the access mode Read/Write and if necessary the data value. The IO-Link device executes the write or read access and responds to the request with a response. In the event of an error (error code = 0x80), an error message provides information about the cause of the error, see chapter 8.5.5.

The complete index is addressed via the subindex 0x00, the individual parameters are addressed via the subindices 0x01...0xFF if they exist.

8.4.1 Index 0x0010 – 0x0018: Identification parameter

The identification parameters contain device data that the IO-Link Master needs during start-up to identify the connected device.

This device data can be read from the device via its index with subindex = 0x00 or written to the device.

The objects with index 0x0040 are optional objects added by the manufacturer.

Index	Object name	Value (StringT)	Access
0x0010	Vendor Name	iwis	ro
0x0011	Vendor Text	www.iwis.com	ro
0x0012	Product Name	CCM-S	ro
0x0013	Product ID	400118xx	ro
0x0014	Product Text	Chain Condition Monitoring	ro
0x0015	Serial-Number	Device-specific	ro
0x0016	Hardware Revision	Device-specific	ro
0x0017	Firmware Revision	Device-specific	ro
0x0040	Chain type	Device-specific	ro
0x0051	Order Number	Device-specific	ro

The following objects provide the user with 32-byte text strings to describe the application, purpose and location:

Index	Object name	Value (StringT)	Type	Access
0x0018	Application Specific Tag	'***'	StringT32	r/w
0x0019	Function Tag (UTF-8)	'***'	StringT32	r/w
0x001A	Location Tag (UTF-8)	'***'	StringT32	r/w

8.4.2 Set Parameters

8.4.2.1 Index 0x0046: Scale Limit

The parameter "Scale Limit" specifies the maximum range for a display of the elongation and is currently only used for visual display via a visualization software.

Indication in 0.1% steps.

Index	Subindex	Name	Length	Type	Access
0x0046	0	Scale Limit	16 Bit	UIntegerT16	r/w

Byte	x+0	x+1
Bit	15 – 8	7 – 0
Data	$2^{15} - 2^8$	$2^7 - 2^0$
Scale Limit (Binary)		

Lower limit	5
Upper limit	50
Default	30 (3,0%)

8.4.2.2 Index 0x0047: Chain Logging Time

This parameter specifies the time at which the current elongation value is stored in the memory.
Time in 0,1h.

Index	Subindex	Name	Length	Type	Access
0x0047	0	Chain Logging Time	16 Bit	UIntegerT16	r/w

Byte	x+0	x+1
Bit	15 – 8	7 – 0
Data	$2^{15} - 2^8$	$2^7 - 2^0$
Chain Logging Time (Binary)		

Lower limit	1
Upper limit	1000
Default	20 (2,0h)

8.4.2.3 Index 0x004E: Standard Command

Execution of a command.

Index	Subindex	Name	Length	Type	Access
0x004E	0	Standard Command	16 Bit	UIntegerT16	r/w

Command – New Chain:

The measured values are reset with the "New Chain" command. This command must be executed when using a new chain or during commissioning.

Index	Subindex	Value	Length	Type	Access
0x004E	0	0x0001	16 Bit	UIntegerT16	r/w

8.4.3 Read Parameters

8.4.3.1 Index 0x0041: Distance

Display of the total distance in m.

Index	Subindex	Name	Length	Type	Access
0x0041	0	Distance	32 Bit	UIntegerT32	Ro

8.4.3.2 Index 0x0042: Running Time

Running time of the chain in 0,1h.

Index	Subindex	Name	Length	Type	Access
0x0042	0	Running Time	32 Bit	UIntegerT32	Ro

8.4.3.3 Index 0x0043: Average Speed

Average chain speed in 0.01 m/s.

Index	Subindex	Name	Length	Type	Access
0x0043	0	Average Speed	16 Bit	IntegerT16	ro

8.4.3.4 Index 0x0044: Actual Speed

Actual speed in 0.01 m/s.

Index	Subindex	Name	Length	Type	Access
0x0044	0	Actual Speed	16 Bit	IntegerT16	ro

8.4.3.5 Index 0x0045: Chain Period

Period length of chain link in 0.01 ms.

Index	Subindex	Name	Length	Type	Access
0x0045	0	Chain Period	16 Bit	UIntegerT16	ro

8.4.3.6 Index 0x0048: Temperature Chain

Temperature of the chain in °C. The temperature sensor is located in the sliding shoe and measures the temperature close to the chain.

Index	Subindex	Name	Length	Type	Access
0x0048	0	Temperature Chain	16 Bit	IntegerT16	ro

8.4.3.7 Index 0x0049: Temperature CPU

Temperature of the CPU in °C.

Index	Subindex	Name	Length	Type	Access
0x0049	0	Temperature CPU	16 Bit	IntegerT16	ro

8.4.3.8 Index 0x004A: Voltage 5V

Display of the 5V system voltage in 0.01V. Valid voltage range from 4.6V to 5.4V.

Index	Subindex	Name	Length	Type	Access
0x004A	0	Voltage 5V	16 Bit	UIntegerT16	ro

8.4.3.9 Index 0x004B: Voltage 24V

Display of the 24V supply in 0,01V.

Index	Subindex	Name	Length	Type	Access
0x004B	0	Voltage 24V	16 Bit	UIntegerT16	ro

8.4.3.10 Index 0x004C: Chain Direction Left

Running direction of the chain, with 1 = running direction left.

Index	Subindex	Name	Length	Type	Access
0x004C	0	Chain Direction Left	8 Bit	UIntegerT8	ro

8.4.3.11 Index 0x004D: Number Chain Link

Number of chain links in a chain. Number of chain links is determined when the Single Link Index is passed through.

Index	Subindex	Name	Length	Type	Access
0x004D	0	Number Chain Link	16 Bit	UIntegerT16	ro

8.4.3.12 Index 0x004F: Count Measure

Number of chain links passed through, this also corresponds to the number of measurements over the entire chain.

Index	Subindex	Name	Length	Type	Access
0x004F	0	Count Measure	32 Bit	UIntegerT32	ro

8.4.3.13 Index 0x0051: Product Specific Number

Article number of the device.

Index	Subindex	Name	Length	Type	Access
0x0051	0	Product Specific Number	8 Byte	OctetStringT	ro

8.4.3.14 Index 0x0052: Custom Device Name

Any name for the device can be assigned here.

Index	Subindex	Name	Length	Type	Access
0x0052	0	Custom Device Name	16 Byte	OctetStringT	r/w

8.4.3.15 Index 0x0053: Number of acceleration data:

Number of acceleration values per 100 chain links which are 20% above the average acceleration value.

Index	Subindex	Name	Length	Type	Access
0x0053	0	Number of acceleration data	8 Bit	UIntegerT8	ro

8.4.3.16 Index 0x0054: Number of length data:

Counts the number of elongation values that are 20% above the mean elongation value. After 100 elongation values, the counter is reset.

Index	Subindex	Name	Length	Type	Access
0x0054	0	Number of length data	8 Bit	UIntegerT8	ro

8.4.3.17 Index 0x0055: Single Link Max Positions

Display of the largest five elongation values with chain link specification. Indication of the elongation as integer representation in steps of 0.001%. These SLE values are reset and recreated after each chain run.

Index	Subindex	Name	Length	Type	Access
0x0055	0	Single Link Max Length 1	16 Bit	UIntegerT16	ro
		Single Link Max Position 1	16 Bit	UIntegerT16	ro
		Single Link Max Length 2	16 Bit	UIntegerT16	ro
		Single Link Max Position 2	16 Bit	UIntegerT16	ro
		Single Link Max Length 3	16 Bit	UIntegerT16	ro
		Single Link Max Position 3	16 Bit	UIntegerT16	ro
		Single Link Max Length 4	16 Bit	UIntegerT16	ro
		Single Link Max Position 4	16 Bit	UIntegerT16	ro
		Single Link Max Length 5	16 Bit	UIntegerT16	ro
		Single Link Max Position 5	16 Bit	UIntegerT16	ro

8.4.3.18 Index 0x0200: Single Link Header

If Single Link data is generated, a header is created.

Index	Subindex	Name	Length	Type	Access
0x0200	0	Single Link Header	128 Bit	RecordT	ro
		Header ID	32 Bit	UIntegerT32	ro
		Size Chains	16 Bit	UIntegerT16	ro
		Size Bytes	16 Bit	UIntegerT16	ro
		Block Size	16 Bit	UIntegerT16	ro
		Reserved	6 Byte	OctetStringT	ro

Header-ID:

Fixed constant 0x07425228

Size Chains:

Number of chain links

Size Bytes:

Number of single link data in bytes. This corresponds to the number of chain links * 2 bytes.

Block Size:

The size of a data block is 128 bytes.

Reserved:

6 Bytes Reserve

8.5 Diagnosis

Description of the diagnosis via IO-Link.

8.5.1 Error Counter (Index 0x0020)

The Error Counter parameter indicates the number of errors (events) that have occurred. The displayed number refers to the period after the last power-up of the supply voltage.

Index	Subindex	Name	Length	Type	Access
0x0020	0	Error Count	16 Bit	UIntegerT16	ro

8.5.2 Device Status (Index 0x0024)

The parameter Device status contains the current device status and can be displayed via the PLC program or via the corresponding IO-Link tools.

In the event of an error, the cause of the error is specified in more detail via the parameter Detailed device status (index 0x0025).

Index	Subindex	Name	Length	Type	Access
0x0024	0	Device Status	8 Bit	UIntegerT8	ro

Parameter value	Description
0x00	No mistake, Device is working properly
0x01	Maintenance (not supported)
0x02	Out of specification (not supported)
0x03	Function test (not supported)
0x04	Error
0x05...0xFF	reserved

8.5.3 Detailed Device Status (Index 0x0025)

The parameter Detailed device status contains the currently pending events in the device and can be displayed via the PLC program or via the corresponding IO Link tools.

Each occurring event of the type error or warning and mode = Event appears is entered into the list with a so-called EventQualifier and EventCode.

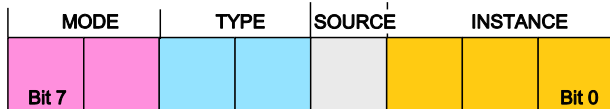
If an error or warning no longer exists, this is indicated with the mode = Event disappears. In this case, the corresponding entry in the list is set to EventQualifier = 0x00 and EventCode = 0x0000. In this way, this parameter always indicates the current diagnostic status of the device.

The entire list can be reset via supply voltage OFF/ON or the system command Restore delivery status.

Index	Subindex	Name	Length	Type	Access
0x0025	0	Detailed Device Status	72 Bit	ArrayT	ro
		Error_Warning_1	24 Bit	3 Bytes	ro
		Error_Warning_2	24 Bit	3 Bytes	ro
		Error_Warning_3	24 Bit	3 Bytes	ro

Byte	x+0	x+1	x+2
Bit	23 – 16	15 – 8	7 – 0
Data	$2^7 - 2^0$	$2^{15} - 2^8$	$2^7 - 2^0$
	EventQualifier		EventCode

Struktur, EventQualifier



Instance, Bit0... Bit2

- 0x04: application error

Source, Bit 3

- 0x00: Device (remote)

- 0x01: Master (local)

Type, Bit 4...5

- 0x02: Warning present

Mode, Bit 6...7

- 0x02: Event disappears

- 0x03: Event appears

Supported EventCodes

EventCode	Device status	Type	Error message	Cause / Solution

8.5.4 Device-specific Diagnosis (Index 0x0050)

The error and status bits of the individual software modules can be read from the CCM-S via this diagnosis.

Each bit defines a message.

The description of the messages or error can be found in chapter **Error! Reference source not found.**

Index	Subindex	Name	Length	Type	Access
0x0050	0	Diagnosis Device Specific	416 Bit	ArrayT	ro
		Module Error 1	32 Bit	UIntegerT32	ro
		Module Error 2	32 Bit	UIntegerT32	ro
		Module Error 3	32 Bit	UIntegerT32	ro
		Module Error 4	32 Bit	UIntegerT32	ro
		Module Error 5	32 Bit	UIntegerT32	ro
		Module Error 5	32 Bit	UIntegerT32	ro
		Module Error 6	32 Bit	UIntegerT32	ro
		Module Error 7	32 Bit	UIntegerT32	ro
		Module Error 8	32 Bit	UIntegerT32	ro
		Module Error 9	32 Bit	UIntegerT32	ro
		Module Error 10	32 Bit	UIntegerT32	ro
		Module Error 11	32 Bit	UIntegerT32	ro
		Module Error 12	32 Bit	UIntegerT32	ro
Module Error 13	32 Bit	UIntegerT32	ro		

8.5.5 ISDU error types

The error type is reported back (response) if the write or read request to an index-linked object (ISDU) could not be executed without errors.

The error type consists of two bytes:

- Error code, High-Byte
- Additional code, Low-Byte

Error code	Additional code	Cause	Solution
0x80	0x00	Error in device application, No details	<ul style="list-style-type: none"> - Repeat service - Device OFF/ON, if the error is still present, the device must be replaced.
0x80	0x11	Index not available	<ul style="list-style-type: none"> - Check available indices
0x80	0x12	Subindex not available	<ul style="list-style-type: none"> - Checking Available SubIndices
0x80	0x20	Service currently not available	<ul style="list-style-type: none"> - Check device operating status - Repeat service - Device OFF/ON
0x80	0x21	Service currently not available, local control	<ul style="list-style-type: none"> - Disable External Access (Device Control Console) - Repeat service - Device OFF/ON
0x80	0x22	Service currently not available, device control	<ul style="list-style-type: none"> - Locking Remote Accesses - Repeat service - Device OFF/ON
0x80	0x23	Access denied	<ul style="list-style-type: none"> - Parameter supports read access only
0x80	0x30	Parameter value out of range	<ul style="list-style-type: none"> - Check permissible parameter values
0x80	0x31	Parameter outside upper limit value	<ul style="list-style-type: none"> - Check permissible parameter values
0x80	0x32	Parameter outside lower limit value	<ul style="list-style-type: none"> - Check permissible parameter values
0x80	0x33	Overflow, parameter length	<ul style="list-style-type: none"> - Check permissible parameter values
0x80	0x34	Undershoot, parameter length	<ul style="list-style-type: none"> - Check permissible parameter values
0x80	0x35	Function not available	<ul style="list-style-type: none"> - Checking Supported System Commands
0x80	0x36	Function currently not available	<ul style="list-style-type: none"> - Check device operating status - Repeat service - Device OFF/ON
0x80	0x82	Applikation still busy	<ul style="list-style-type: none"> - Wait for complete initialization - Repeat service - Device OFF/ON

8.5.6 Process data Status

Each port (IO-Link Device/Master) has a value status (PortQualifier). The value status indicates whether the process data is valid = VALID or invalid = INVALID.

With regard to the process input data, the measuring system also sends the process data status to the IO-Link master in each cycle of the process data. This status is evaluated by the IO-Link master and marks the process data accordingly.

9 Technical data

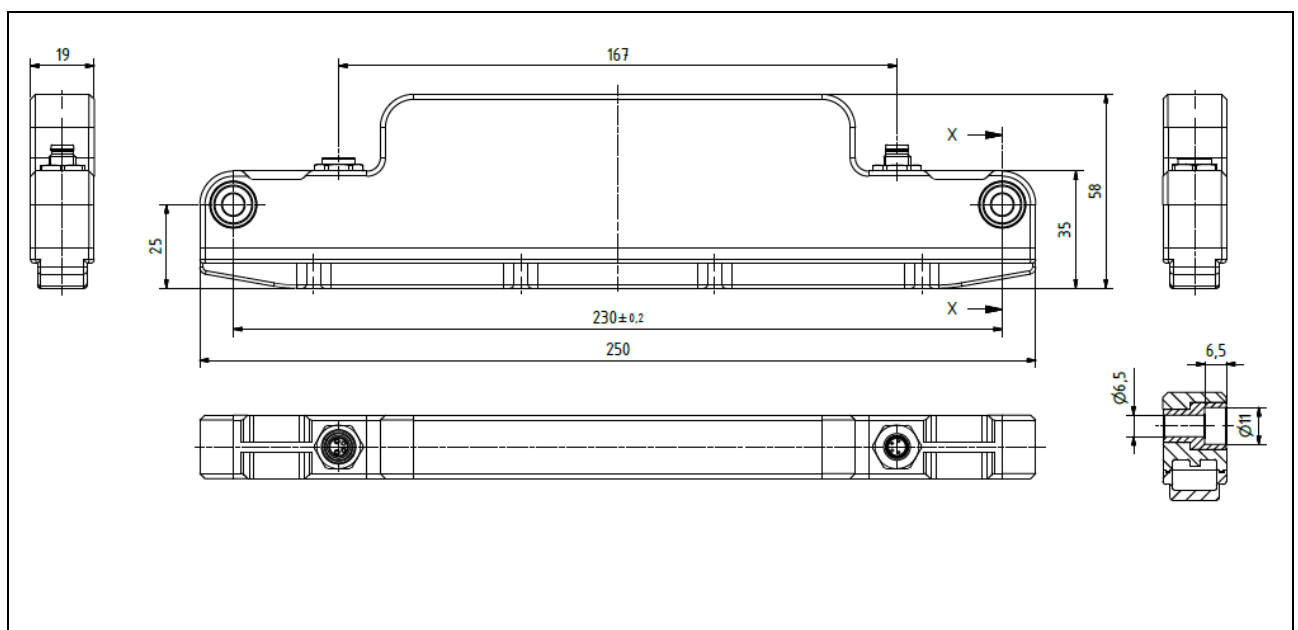
9.1 Technical data CCM-S

Characteristic	Characteristic value
Electrical operating data	18 - 30V DC 50 mA
Protection class	IP67
Environmental temperature	0 °C bis 60 °C*
Relative humidity	10 to 90 %, no condensation
Chain speeds	See table below
Load directions	Both main load directions permissible
Certifications	-
Weight	- 0,2 kg
Fastening systems	Customer-specific
Communication	IO-Link

Allowed chain speeds:

Chain Size	Allowed chain speeds in m/s
08B / 08A	0,10 – 5,00
10B / 10A	0,10 – 5,00
12B / 12A	0,10 – 5,00
16B / 16A	0,10 – 5,00
20B / 20A	0,10 – 5,00
24B / 24A	0,10 – 5,00
28B / 28A	0,10 – 5,00
32B / 32A	0,10 – 5,00

9.2 Technical drawing CCM-S



10 Declaration of Conformity

Declaration of conformity

	Hersteller Manufacturer
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Fax	Fax: +49 89 76909-1333
Produktname Product	CCM-S CCM-S
Objektbeschreibung Object description	Kettenlängungs-Überwachungssystem misst die Verschleißlänge von Ketten Chain elongation monitoring system measures the wear elongation of chains
Gegenstand Klassifizierung Object classification	Gerät Apparatus
Verwendungszweck Intended purpose	Kettenlängungs-Überwachungssystem <i>Chain Condition Monitoring</i>
Richtlinie Directive	2014/35/EU 2014/35/EU

Das Produkt entspricht den grundlegenden Anforderungen und Bestimmungen der folgenden Normen und Methoden:

The Product complies with the essential requirements and provision of following standards and methods:

Emissionsanforderungen: **EN 61000-6-2:2006-03; VDE 0839-6-2:2006-03**
Emission requirements: **EN 61000-6-3:2011-09; VDE 0839-6-3:2011-09**

Umgebungsanforderungen: **EN 60068-2-27:2010-02; VDE 0468-2-27:2010-02**
Environmental requirements: **EN 60068-2-6:2008-10; VDE 0468-2-6:2008-10**
EN 60068-1:2015-09; VDE 0468-1:2015-09
ISO 9227:2015-09

Transport: **IATA 953**
Transport requirements:

Diese Erklärung wird verantwortlich abgegeben durch:
This declaration is submitted by:

11 Disassembly and disposal

The device is not allowed to be disposed of with municipal waste (household waste). To return your old device, please use the return and collection systems available to you. Careless disposal of the product can lead to environmental pollution. Dispose of the device in accordance with the national regulations of your country.

12 Other applicable documents

13 References

1.	IO-Link Specification	IO-Link Interfaces and System Specification V1.1.2, Order-Nr.: 10.002, http://www.io-link.com/
2.	IO-Link Specification	IO-Link Smart Sensor Profile – Specification V1.0, Order-Nr.: 10.042, http://www.io-link.com/
3.	IO-Link Guideline	IO-Link Planning guideline, Order-Nr.: 10.911, http://www.io-link.com/
4.	IO-Link Specification	IO-Link Common Profile – Specification V1.0, Order-Nr.: 10.072, http://www.io-link.com/
5.	IEC 61131-9	Programmable logic controllers Part 9: Interface for the communication with small Sensors and actuators via a point-to-point connection
6.	IEC 60947-5-2	Low-voltage switchgear, controlgear and controlgear switching elements - Proximity switches
7.	IEC 61076-2-101	Connectors for electronic equipment

14 Abbreviations / terms used

EMV	Electromagnetic compatibility (=Elektro-Magnetische-Verträglichkeit)
IO-Link-Device	Sensor (measuring system) or actuator
ISDU	I ndexed S ervice D ata U nit, Service data addressed via indexes, which are transmitted acyclically and with confirmation.
PNO	PROFIBUS Nutzerorganisation e.V.
SDCI	Single-drop digital communication interface for small sensors and actuators

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